US Army Corps
of Engineers
Southwestern Division
Reservoir Control Center

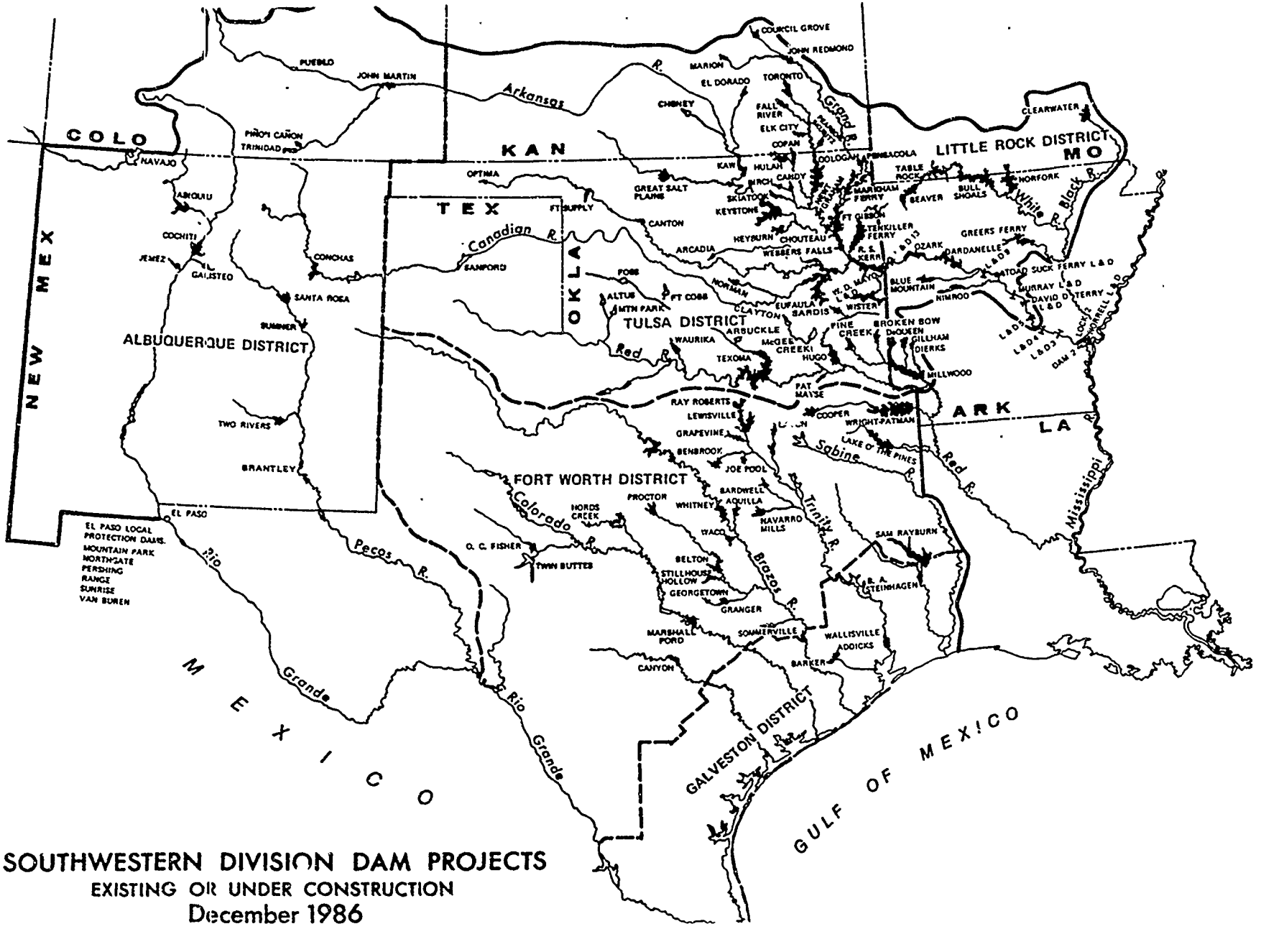
# Annual Report 1989

## January 1990





THE PACESETTER DIVISION




# SOUTHWESTERN DIVISION DAM PROJECTS

EXISTING OR UNDER CONSTRUCTION

December 1986

1989

# ANNUAL REPORT

# RESERVOIR CONTROL CENTER

# SOUTHWESTERN DIVISION

PLATE



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# RESERVOIR CONTROL CENTER

# 1989 ANNUAL REPORT

# SECTION I - INTRODUCTION

## SECTION I - INTRODUCTION

1. PURPOSE OF REPORT. This report presents activities and accomplishments of the Southwestern Division (SWD) as related to reservoir regulation and water management activities throughout FY 1989. Detailed summaries of reservoir conditions, water quality activities, minutes of coordinating committee meetings and minutes of the 1989 Annual Reservoir Control Center meeting are also included.

This report is prepared in conformance with ER 1110-2-1400, 24 April 1970, Reservoir Control Centers, paragraph 12c.

2. REFERENCE. Reservoir Control Center (RCC) - SWD Guidance Memorandum, dated June 1971, approved by the Chief of Engineers as a general basis for the RCC's activities.

3. OBJECTIVES OF THE RESERVOIR CONTROL CENTER. The SWD RCC was established in 1967 by the Chief of Engineers to improve capabilities of the Corps of Engineers to perform its civil works mission as related to operation of reservoirs. The SWD RCC carries out its responsibilities by:

a. Organizing coordinating committees and/or participating in committees to accomplish mutual understanding among water interests regarding use and regulation of water resources.

b. Providing interbasin coordination of day-to-day regulation needs for river systems for all purposes.

c. Surveillance of daily operations and continuous analysis of Project needs.

d. Furnishing technical assistance to personnel of District offices in related efforts to improve the reliability of regulations and hydrologic determinations.

e. Provide management and technical guidance for the development and operation of the Division-wide dedicated water control data system. This system includes the equipment and software used for the acquisition, transmission and processing of real-time hydrologic and meteorological data for the purpose of regulating projects for which the Corps of Engineers has responsibility.

# SECTION II - WATER CONTROL ACTIVITIES IN SWD

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### 1. RESERVOIR REGULATION

a. Lake Regulation During FY 89. Lake regulation activities for Division lakes and Section 7 lakes during FY 89 are summarized in Section VI of this report. Operational data summaries for all of the SWD projects, including Section 7, are shown in tabular form, Section VII. An index, by basin, to these tables is included which also lists pertinent data for each project. Also included is a listing in alphabetical order giving names of both the lake and dam where different.

b. System Studies - FY 89

(1) White River Super Model - Little Rock District Reservoir Regulation.

a. Four additional simulations were made for the Little Rock Reservoir Regulation Section in their attempt to develop a regulation plan to enchance farming along the the White River.

b. The Model was modified to include Judsonia as a control point. The Hydrology was updated and modified to reflect this change. Three runs were made using this modification.

(2) Red River Super Model - Tulsa. The Hydrology and Model was updated thru 1986. The model was modified to include Marietta, Durwood and Durant Reservoirs. Big Pine Lake and the Broken Bow Rereg structure were removed. Nine runs were made in connection with the Denison pool stabilization study.

(3) Trinity River Super Model - Fort Worth District. The collection and verification of the data was completed. The model was set up and preliminary runs made toward verification of the model. This model will be used for the Trinity River Regulation study.

(4) Arkansas River Super Model-Tulsa & Little Rock Districts. Arkansas River Feasibility Study. Additional runs were made in an attempt to develop new operation plans.

(5) Broken Bow Fishery Simulations - Tulsa District. Studies of mandatory releases to maintain a put and take trout fishery below Broken Bow Reservoir.

(6) Tenkiller Water Supply/Hydropower Study - Tulsa District. Study to determine the impact on Hydropower output by increasing the top-of-conservation pool from elevation 630 to 632 for water supply.

(7) Denison Restudy - Tulsa District. A study to determine the effects of pool manupilations on hydropower production. Also, a power study to determine the effect of a proposed new installation on the downstream fisheries.

c. Water Control Manuals. A summary entitled "Status of Water Control Manuals in SWD" is included in Section IV of this report. The summary gives the status and completion schedule through FY 1991 for manuals and plans for 118 lakes and 17 river systems and subsystems. Also shown in Section IV is a schedule for completion of high priority Water Control Plans for FY 90 thru FY 95. At the end of FY 1989, there were 97 Corps of Engineers projects (80 lakes and 17 locks and dams) and 19 Section 7 lakes in operation in SWD.

During FY 1989, the SWD Reservoir Control Center received and reviewed eleven water control manuals that were submitted by the Districts. The schedule for FY 1990 includes the development of six new manual and the revision of thirteen existing manuals.

d. Drought Contingency Plans. A letter dated 8 June 1988 Subject; "Drought Contingency Plans (DCP)" renewed efforts within the Southwestern Division for the development of DCP's and provided additional guidance to supplement that contained in ER-1110-2-1941. This letter requested that DCP's be developed for all Corps projects with controlled reservoir storage and that the plans should only address temporary project modifications to satisfy short-term needs that can be implemented within existing authorities. During FY 88 several meetings were held in the SWD office with District personnel to develop a framework for DCP's, submittal schedules, review procedures, funding, etc. It was agreed that the DCP's would address individual projects. However, they would be developed on a river basin or sub-basin concept to include like projects. Each of the documented DCP's will become an appendix to the respective river basin Master Water Control Manual. A total of 23 DCP's will be developed for the river basins within the SWD by 1991. Table IV showing the river basin and projects within each basin is included in Section IV of this report. The table also shows a schedule for completion of the 23 DCP's. At the end of FY89 a total of 15 plans had been submitted for review. Of these plans, seven were first draft reports, one final draft and seven finals. In FY 90 the remainder of the plans are scheduled for submittal. All plans are scheduled to be approved during FY91.

e. Section 7 Project Regulation. Within SWD there are 19 existing Section 7 reservoirs owned and operated by other agencies. The flood control storage contained in these projects are regulated by the Corps in accordance with Section 7 of the Flood Control Act of 1944. The Districts are continuing their efforts to bring the manuals and regulation plans into compliance with requirements contained in paragraph 208.11, Part 208 Flood Control Regulations, Chapter 11, Title 33 of the Code of Federal Regulations (41 FR 20401, May 18. 1976). Due to the varied approaches between the Districts on real time regulation for Section 7 projects, SWDO issued a policy letter on 21 March 1983.

The purpose of the letter was to supersede previous SWDO guidance and to provide current policies on Section 7 projects. This letter and subsequent letters have been issued to the Districts requiring that policy on Section 7 projects be coordinated with project owners and that finalizing of water control manuals for existing projects should be expedited.

2. SOUTHWESTERN DIVISION WATER QUALITY PROGRAM AND ACTIVITIES.

a. Responsibilities. The Water Management Branch, Engineering Division is assigned the responsibilities to coordinate and direct activities within the Southwestern Division in the water quality field. This provides for water quality objectives being included as an effective part of our total water management program. Specific activities in the water quality program are as follows:

(1) Conduct technical studies and provide guidance on water quality control.

(2) Review and provide technical assistance in programs for predicting the natural and modified water quality in impoundments, rivers, coastal areas, and estuaries for project planning, design, and regulation activities.

(3) Review and provide technical assistance on project design and reservoir regulation studies in connection with water quality control performed within the Division, including multiple level outlet facilities, reservoir simulation studies, reregulation structures, and release reoxygenation systems.

(4) Provide coordination support in interagency liaison as related to water quality control through reservoir regulation, including formulation of operating plans and cooperative data collection programs.

(5) Coordinate with Planning and Construction-Operations Divisions, and the Districts on SWD water quality investigation programs.

(6) In coordination with the Geotechnical and Materials Branch, manage the water quality investigation activities of the Division laboratory.

(7) Responsible for technical engineering solutions to water quality problems in existing projects: reviewing, coordinating, and acting as consultants to other engineering and planning elements in the Division office and District offices.

(8) Coordination of Division actions required by ER 1130-2-334 for reporting of water quality management of Corps projects.

b. ORGANIZATION.

(1) Division. Water quality activities in the Southwestern Division are coordinated within the Water Management Branch, Engineering Division. These duties require the part-time efforts of two engineers in the Water Management Branch, one biologist in Construction-Operations Division and a fisheries biologist in Planning Division. Mr. Charles Sullivan, Chief, Reservoir Control Center, is the SWD member on the HQUSACE Committee on Water Quality.

(2) Districts. The organizations for water quality management vary within the Districts. Water quality associated with planning and design of the projects is coordinated by organizational elements within the Engineering or Planning Divisions in all of the districts. Monitoring and reporting specifically required by ER 1130-2-334 and that required for dredging and other construction activities are done by the Construction, Operations, Engineering or Planning Divisions in the various districts depending on their capabilities.

(3) Laboratory. The Division laboratory is staffed and equipped to conduct water quality testing required by the Districts for use in planning, design, construction, and operation of the projects. However, because of location, costs and other factors most water quality testing by the Districts is contracted with private or other government laboratories.

c. Special Activities in FY 89.

(1) Specific Project Problems. Water Quality related problems and activities at individual projects are discussed in the District reports. Other items in this section are highlights of activities.

(2) Water Quality Management Reports. Water quality management reports were completed for two additional projects in FY 89. Water quality management reports are now available on 20 SWD projects. Most of these reports are for Fort Worth District projects.

(3) Baseline Data. Baseline data acquisition was initiated at one additional SWD reservoir project in FY 89. As of the end of the year base line data has been obtained at over 40 reservoirs. Our goal in this program is to develop a water quality data base for all SWD reservoir projects.

(4) Canyon Lake Non-Federal Hydropower Development. The Waterways Experiment Station (WES) selected Canyon Lake as a research field site for developing techniques to evaluate the impacts associated with installation of hydropower at Corps dams.

An intensive water quality data collection program was initiated in the summer of 1988 to determine base (prior to power-on-line) conditions. The study continued through the summer of 1989 to determine post project conditions.

(5) Table Rock Dissolved Oxygen. Little progress was made in FY 89. WES conducted dye tests in the lake to determine hypolymnetic flows through the lake on the main stem from Beaver Dam and on the Long Creek arm of Table Rock Lake during power generation. Test results will be used in determining the placement and size of an in-lake oxygen injection system. Present plans are to do preliminary design for the in-lake system in FY 90 as funds are available. The penstock oxygen injection system is being automated. The system includes a tailwater dissolved oxygen monitor, programmable logic controller and electrically operated valves that will inject oxygen in quantities necessary to maintain a pre-programmed dissolved oxygen level in the tailwater. The system will be operational this fall.

(6) Lake Texoma Net Pen Aquaculture Demonstration. Water Quality data acquisition in conjunction with the net pen aquaculture of channel catfish demonstration project was concluded in June 1989. The sampling program was undertaken to determine the effects of net-pen aquaculture on lake water quality. The final report is scheduled for completion in January 1990.

d. Immediate Goals. The following actions have been scheduled for accomplishment in the near future:

(1) Continue the present intensive monitoring program for SWD reservoirs. This ongoing program will be continued until base line data are available for all SWD reservoirs.

(2) Review the basic water quality monitoring program.

e. Long-Term Goals. The following are presently considered as long-term continuous goals of this Division, and consequently the Water Management Branch, in the water quality field.

(1) To obtain sufficient water quality information from all of our projects to determine whether all state standards and environmental objectives can be met without adverse impact on authorized uses.

(2) To promote the organization of effective water quality elements in the Division and Districts to obtain the maximum coordination for handling all water quality matters in the Division.

(3) To provide helpful and thorough guidance to the Districts on water quality matters.

3. SWD SEDIMENT PROGRAM AND ACTIVITIES. Sediment activities for the year included field surveys for reservoir sedimentation resurvey reports at four SWD reservoir projects. Funding restrictions eleminated surveys of the other four scheduled reservoirs. The 247 sediment ranges along the McClellan-Kerr Arkansas River Navigation Project are scheduled to be resurveyed as close to annually as possible. None of the sediment ranges were resurveyed in FYs 88 or 89 due to funding priorities assigned to sediment activities. Several water contracting entities have expressed an interest in obtaining resurveys to determine the depletion rates on their resource but we have been unable to obtain the necessary funding.

4. DATA COLLECTION AND MANAGEMENT.

a. Stream Gaging Program. The reporting and measurement of flow, water quality and sediment data are required for regulation, investigation and design of water resources projects. Most of these data are obtained through a Cooperative Steam Gaging program between the Corps and the U.S. Geological Survey (USGS). During FY 1989 the SWD-USGS cooperative program contained 440 surface water stations, 49 water quality stations, and 46 suspended sediment stations. An additional 82 stations were operated independently by the District Corps offices. In FY 89, the total cost of the SWD program was $3.0 million with $2.6 million being transferred to the USGS. The following tabulation shows a breakdown of the program by class of funds used to finance the program.

| Class of Funds | C of E Cost ($1,000) |
|---|---|
| Survey Investigation | 15 |
| General Coverage | 43 |
| Planning | 0 |
| Operation & Maintenance | 2,480 |
| New Work & Construction | 41 |
| TOTAL: | 2,579 |

b. Cooperative Reporting Networks. The National Weather Service (NWS) and the Corps of Engineers began their 52nd year of cooperation in establishing and operating networks of river and/or rainfall reporting stations. Reports from these stations supplement those stations that are maintained by the NWS which are made available to the Corps of Engineers for flood control operations and flood forecasting. Data from these networks are transmitted to the Corps of Engineers District and Division offices via telephone and computer interface from the NWS collection office. A direct interface between the NWS S/140 computers

located in the Fort Worth, Texas and Tulsa, Oklahoma NWS River Forecast Centers and the Corps Water Control Data System (WCDS) Harris carries hydrological reports, and other data essential to our water control management functions. These data include detailed precipitation reports, river stage information, warnings, descriptions of severe storms and floods, and river forecasts developed by the NWS. The RFC at Fort Worth is replacing their S/140 with two 386 PC's. This should improve the service to SWD's Districts and Division Offices. Also, additional graphic products will be added to the current product list. These additions are mostly meteorological products. SWDO has also obtained a small computer which dials NWS radar sites for current radar images which can be stored for later viewing.

The estimated FY 1989 cost for SWD responsibilities in supporting 490 rainfall stations in the NWS Cooperative Reporting Networks was $255,947.

c. Water Control Data System. The "Water Control Data System Master Plan" for SWD, dated April 1979 was approved by the Office, Chief of Engineers in June 1979 for funding and detailed design. A "Water Control Data System Software Manual," dated February 1983 was developed as the system software design document.

The first meeting of a work group to begin planning for the life-cycle replacement of the existing WCDS computers was held on 19-20 October 1988 in St Paul MN. After this and a subsquent meeting of the group at Ft Belvoir on 14-15 February 1989 it was determined that the WCDS Master Plans would require updating to refelect the future requirements. The updated Master Plan is due for submission to the Office of Chief of Engineers(OCE) by mid January 1990.

(1) Communication.

(a) The Data Collection Platforms (DCP's) transmit the remote gaging station data over the Geostationary Orbiting Environmental Satellite (GOES) System. A Direct Readout Ground Receive Station (DRGS) is located at Fort Worth, Texas, for receipt of the GOES transmission. The SWD DRGS was installed at the Federal Center in Fort Worth, Texas, in September 1983. This is a Synergetics Model 10C direct Readout Ground Receive Station equipped with 2 antennas (one for GOES east and one for GOES west). Both dial-up and direct line access is provided between the DRGS and the WCDS computers. In September 1988 the DRGS was transferred to the U S Geological Survey (USGS) in accordance with a Memorandum of Agreement between the Corps and the USGS. In accordance with the MOU the USGS will operate the DRGS and provide for the real-time transfer of GOES data to the Corps, plus backup support from other USGS DRGS.

(c) Transfer of National Weather Service (NWS) Automated Field Office Service (AFOS) data between the Corps and National Weather Service River Forecast Center computers is on a continuous basis via direct lines from both the Tulsa RFC and Fort Worth RFC.

(d) Communication between the District and Division data processing units is via the Division wide data communications network.

(2) Data Acquisition and Analysis.

(a) In June 1982, the RCC began using the Water Control Data System Computer (Harris 500) located in the Southwestern Division office, for computations that are necessary in the RCC's daily water control activities. Harris minicomputers were installed in the SWDO, Tulsa District, Fort Worth District, and Little Rock District offices as a part of the division wide Water Control Data System. The Albuquerque and Galveston Districts operate remotely from the computer located in SWDO. During FY 85 (as part of a Corps wide procurement contract) the original H-100 and H-500 computers were replaced by Harris 1000 computers at each of the four sites. The hardware at each site is compatible in order to allow the use of common software and data exchange between offices.

(b) A division wide data base is maintained on the SWDO machine and the other sites to maintain a data base applicable to the site. As part of the Continuity of Operations Plan(COOP) discussed later, the Ft. Worth data base contains data to provide back-up capability fo- the Dallas users and the Tulsa and Little Rock sites contain back-up for each other. The data bases at each District office are available to the Division office. The current data base uses the "TOTAL" data base management system and the SHEF code for data exchange with the National Weather Service. During FY 89 work continued on software development for analysis and display of the data.

(3) Data Display and Distribution. Data is displayed in individual offices with color graphic CRT's, PC's, plotters, and printers. Six(6) 386 based PC's were purchased this year. Graphic applications programs utilize "TEMPLATE" Software which is licensed by Megatek Corporation. Provisions are made to exchange data with other water management cooperators. Examples of cooperative data exchange requirements are the Office of Chief Engineers, Lower Mississippi Valley Division (LMVD), National Weather Service, Southwestern Power Administration (SWPA), state and local river authorities or agencies. During the past year several routines were developed for the display of information in a graphical format. There also have been several routines developed for display of current project data and reports.

SWD assembled a task group to update the SWD WCDS Master Plan to reflect the future needs of the WCDS. This task group consisted of a member from each of the five(5) district offices and the division office. The draft update was completed this year and is expected to be finalized for submission to OCE in FY90 to meet the above due date.

d. Cooperative Data Base and Forecasting Activity. The RCC continues to participate in and encourage the advancement of programs for automated data collection and interagency cooperation in forecasting activity and data base utilization. Currently, SWD maintains a data base on the WCDS for Daily Generation reports, and daily River Reports. These data bases are updated daily and the data are maintained until the end of the month then used for monthly summaries. These data, with several District auxiliary programs and data bases, have been used to make forecasts and reports available for exchange as needed between the Districts and SWDO. In addition, the data are made available to other users which have a need to be aware of the water control activities. Several users have participated in using the USGS WATSTORE data bank for storing and retrieving data.

e. Continuity of Operations Plan (COOP). During the past year a draft COOP for the Southwestern Division Water Control Data System has been developed. This plan outlines procedures for providing back up capability in the event of an equipment failure at any one of the computer sites in the SWD WCDS. The general scheme of the plan is for each site to have a designated back-up site which maintains a current data base and software which will support the site in the event of a computer failure.

f. Inland Water Resources Remote Sensing Demonstration Program. SWD serves as a working group member for this five (5) year program which began in FY86 and is scheduled to end in FY90. The Inland Water Resources Remote Sensing Demonstration Program is a cooperative project between the Cold Regions Research and Engineering Laboratory (CRREL) the Rock Island District. One objective of the program is to demonstrate the use of in-situ, aircraft, and satellite remote sensing data in the Corps water resource mission area. Comparisons of information content, reliabilty, the cost of acquiring and analyzing remote sensing data, and the integration of remotely sensed data into the WCDS are being addressed in the study.

Specific remote sensing technology applications are being demonstrated for several Rock Island District functions. These include evaluating sensors that acquire real-time data about enviromental, hydrologic and geotechnical parameters for determining dam and levee structural integrity; collecting water control data for navigation, reservoir regulation, basin hydrologic

monitoring and model validation; monitoring water quality for dredging, hydropower and reservoir regulation; and developing a spatial data base for use in real-time flood forecasting models.

g. Rainfall forecasting. The National Weather Services Next Generation Weather Radar(NEXRAD) will be installed during the period 1990-1995. NEXRAD will provide SWD with timely rainfall reports which will be included in the SWD data base and can be used in running forecast models.

5. COORDINATION WITH WATER MANAGEMENT INTERESTS.

a. General. The benefits deriving from personal contact with other persons associated with water management activities are well recognized by the RCC. For this reason, special emphasis has been placed on maintaining this personal contact through meetings and workshops sponsored by the Districts and the RCC with the marketing agency, project personnel, river basin authorities, other Divisions, the Chief's office and others.

(1) The Hydrologic Engineering Section and the Hydraulics Section (other sections in the Water Management Branch) furnish support to the RCC. The Hydrologic Engineering Section conducts systems studies of Reservoir Regulation and the Hydraulics Section reviews studies on sediment and water quality activities.

(2) A meeting of Reservoir Control personnel of each of the Districts is held annually by the Division Reservoir Control Center for the purpose of discussing timely topics and exchanging information. Periodically the Hydrologic Engineering and the Hydraulics Sections will hold joint meetings with the RCC. This year the RCC meeting was held separately in the Albuquerque District office. This was the first time the RCC Annual Meeting was held someplace other than at the Division office. The minutes of the RCC Annual Meeting held on 6 and 7 December 1989 are included in Section VIII.

b. Agency coordination.

(1) Arkansas River Basin Coordinating Committee. After being inactive since the 30 April 1982 meeting in Little Rock, Arkansas the committee was reestablished in connection with the notification of adoption of the "1986 Arkansas River Water Control System Operation Plan." The notification for the plan was issued on 17 June 1986 with the plan becoming effective on 1 July 1986. The third meeting of the reestablished committee was held in Dallas on 12 May 1989. At this meeting it was agreed to hold another meeting in the Spring of 1990. The minutes of the meeting are included in section VIII.

MEETINGS OF THE REESTABLISHED ARKANSAS COORDINATING COMMITTEE

| Meeting | Date |
|---|---|
| 1 | 28 Jan 1987 |
| 2 | 6 Jun 1988 |
| 3 | 12 May 1989 |

(2) Trinity River Basin Water Management Interest Group. A meeting of Water Management Interest from the Upper Trinity Basin was held in Dallas on 1 August 1989. The meeting was attended by 40 representatives from federal, state, and local agencies which have an interest in water management in the Trinity River Basin. The minutes of the meeting are included in section VIII. This meeting is not an annual meeting, but is called whenever sufficient interest indicates a need for this meeting.

(3) Trinity River Basin Seminar for Lake Operators. This was the first meeting of the Trinity River Basin Lake Operators and was held in Ft. Worth on 19 October 1989. The meeting was attended by 24 representatives from Federal, state and local agencies which have an interest in lake operations in the Trinity River Basin. The purpose of the meeting was to exchange information and discuss problems common to the regulation and operation of lakes in the basin. The need for a meeting of this group was suggested at the Trinity River Basin Water Management Interest Group Meeting which was held earlier. The minutes of the meeting are included in section VIII.

(4) Cooperation with Lower Mississippi Valley Division.
The SWD RCC continues its cooperation with LMVD and provides observed, as well as forecasted data, that are significant to the water management activities in LMVD.

(5) Cooperation with Southwestern Power Administration.
The SWPA is an agency of the United States, established in the Department of Energy, to execute the purposes of the Flood Control Act of 1944 with respect to the disposition of the electric power and energy made available from the reservoir projects under control of the Department of the Army in the area comprising all of Arkansas and Louisiana and portions of Missouri, Kansas, Texas, and Oklahoma. The scheduling of releases for hydropower production from the 17 Corps of Engineers projects within SWD has a significant effect on the overall water management activities in the Division. Therefore, close cooperation and continuous communication between the Corps and SWPA are mandatory. A Memorandum of Understanding was signed by the SWPA and the Corps of Engineers in 1980. SWPA and SWD have proceeded to develop a draft detail Operating Arrangement to assist in the operations of hydropower projects within SWD. SWD has formally informed the SWPA that the draft document would be its policy for coordinating operations with them until such time that both agencies have signed the arrangement. Specific activities included in the Operating Arrangement for cooperation between SWPA and RCC are monthly scheduling of power production, preparation of data for reports to the Federal Energy Regulatory Commission (FERC), and daily coordination of routine data on current conditions, inflow forecasts, and release schedules. The RCC has taken every opportunity to improve and strengthen relations with SWPA through correspondence, regularly scheduled and special meetings, providing access to our computer systems, and by special studies aimed at improving energy production and scheduling at SWD power projects.

(6) National Weather Service.National Weather Service. A NWS Interagency Support Agreement was signed by General Lee on 17 July 1988 for hydrometeorological services for the Southwestern Division. The agreement provides that a full time NWS meteorologist be assigned to the Reservoir Control Center. The position was filled on 1 Jan 1989. The NWS to COE transfer of AFOS products has continued during the year via the RFC Fort Worth and RFC Tulsa S140 computers. Upgrading the RFC Fort Worth capability for transferring AFOS products is underway and should be accomplished by February 1990. The plans are to replace the S140 com-

puter with a Compaq 386. The NWS also has plans to replace the S140 at Tulsa. SWT and SWD are working with the Tulsa RFC in defining backup capability for NEXRAD products through the Tulsa RFC. Personnel at the NEXRAD Operational Support Facility (OSF) are currently working on research projects to produce 0-6 hour and 6-12 hour Quantitative Precipitation Forecasts (QPF's). A test for this procedure will be accomplished during the spring of 1990.

(7) Tri-Agency NEXRAD Group. The Southwestern Division was appointed the lead Division by OCE at a meeting on 1 Jun 89 for the technical development of the Next Generation Weather Radar (NEXRAD) for Corps of Engineers needs. This responsibility has resulted in several meetings with the Tri-Agency developers of NEXRAD, i.e., the US Air Force (DOD), National Weather Service (DOC) and the Federal Aviation Administration (DOT). When doppler radars are fully operational throughout the country, the USACE will have 45 sites including Division and District offices with connection capability to access 133 NEXRAD sites for retrieval, storage,and display of real-time precipitation accumulations and other derived products for water control managers. The first radar will be deployed at Oklahoma City in July 1990, and the remainder will come off the production line at a rate of about 4 per month until the network is completed in 1995. The USACE will use a PC based Principal User Processor Inactive Emulator (PUPIE) to communicate with the NEXRAD sites. SWD is working with HEC and SWT to define specifications for the PUPIE and also participate with the tri-agency group in a communication network for NEXRAD data. A contract is expected to be let in Jan 1990 for the development of the PUPIE. The proposed tri-agency network should be available in FY91.

# Section III - FACILITIES AND PERSONNEL

## SECTION III - FACILITIES AND PERSONNEL

### 1. Facilities.

a. Office Space. SWDO personnel occupies quarters on the third floor in the Sante Fe Building, 1114 Commerce Street, Dallas. Texas. Space occupied by the RCC includes an open-space working area, and an equipment room.

b. Display Facilities. All of the display equipment used for conferences and for briefings of higher authorities are located in the Engineering Division conference room. This room has limited space and equipment; but, it does include chalkboards, white metal panel adequate for use of markers, portable projection equipment, a video tape recorder, a projection screen, and a Barco Data 600 large screen display unit driven by an IBM-AT.

c. Communications Equipment. The equipment room contains a multiplexor, two dot-matrix hard-copy TTY terminals, one letter quality terminal, a Tektronix color graphics terminal with plotter, printer and digitizing tablet, IBM-AT which is used to drive the large screen display, Sony color monitor with VTR and an Alden Color Radar system. The Sony color monitor is used to monitor and record weather and news events on the Cable News Network, Weather Channel, and local TV stations. The Alden Color Radar system is used to monitor and record radar images from National Weather Service radars within SWD and along the Gulf Coast.

### 2. Personnel.

a. Staff. The authorized staff of the RCC consists of one supervisory hydraulic engineer, two hydraulic engineers, one hydrologic technician, and one meteorologist(NWS employeee). The RCC is supported in technical studies by the Hydrologic Engineering and the Hydraulics Sections. The current organization chart for the SWD Water Management Branch is shown in figure 1.

b. Training. The RCC periodically assesses the training needs of its personnel and schedules that training which is required and possible. Training for the past year included a course on DBASE III+.

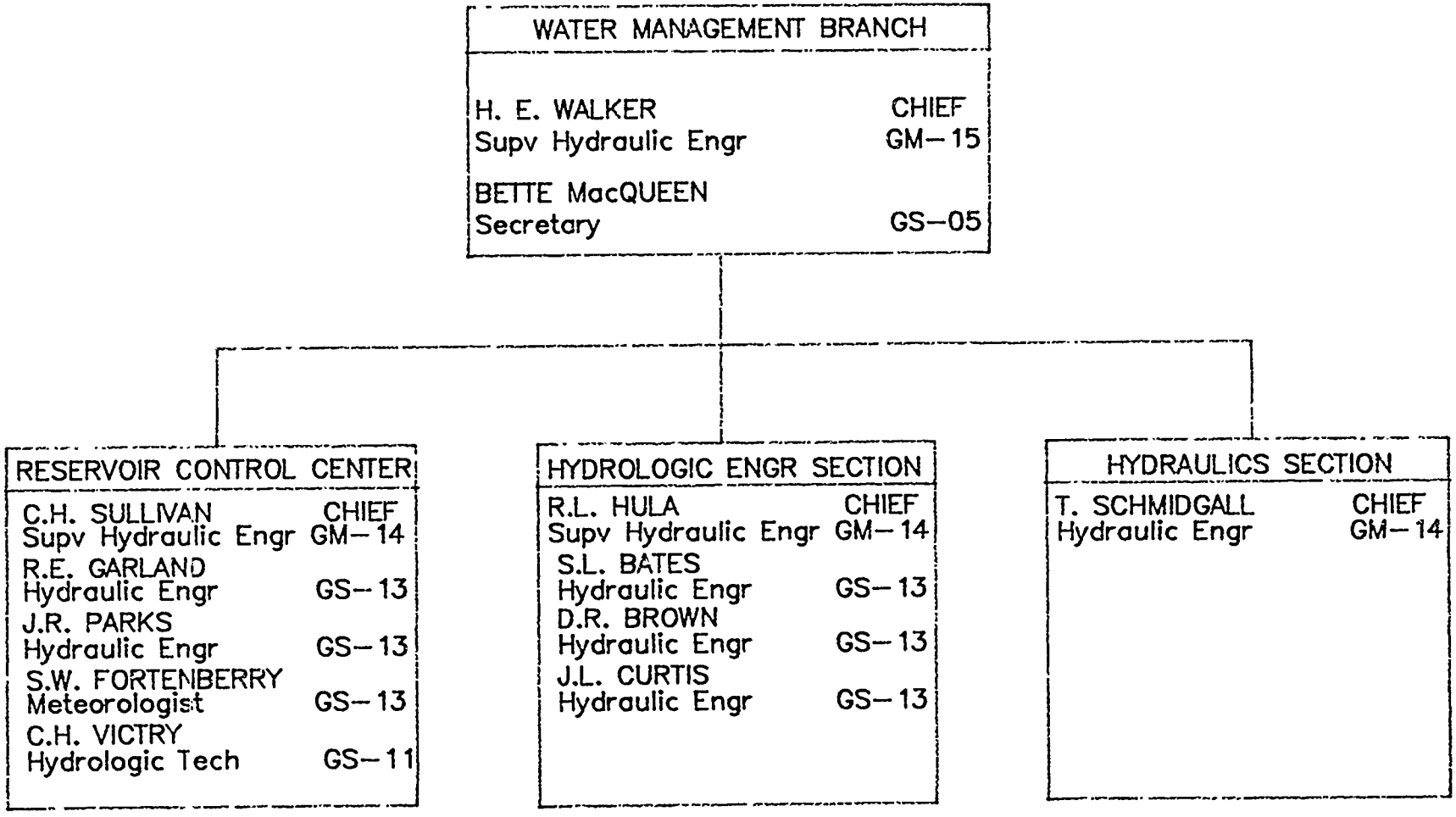

WATER MANAGEMENT BRANCH
H. E. WALKER
CHIEF
Supv Hydraulic Engr
GM—15
BETTE MacQUEEN
Secretary
GS—05
RESERVOIR CONTROL CENTER
C.H. SULLIVAN
CHIEF
Supv Hydraulic Engr
GM—14
R.E. GARLAND
Hydraulic Engr
GS—13
J.R. PARKS
Hydraulic Engr
GS—13
S.W. FORTENBERRY
Meteorologist
GS—13
C.H. VICTRY
Hydrologic Tech
GS—11
HYDROLOGIC ENGR SECTION
R.L. HULA
CHIEF
Supv Hydraulic Engr
GM—14
S.L. BATES
Hydraulic Engr
GS—13
D.R. BROWN
Hydraulic Engr
GS—13
J.L. CURTIS
Hydraulic Engr
GS—13
HYDRAULICS SECTION
T. SCHMIDGALL
CHIEF
Hydraulic Engr
GM—14

FIGURE 1

# SECTION IV

# STATUS OF RESERVOIR WATER CONTROL MANUALS AND DROUGHT CONTINGENCY PLANS

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1990

| RESERVOIR | STREAM | OWNER | DIST | APPROVED | | | SCHEDULED THRU FY 92 | |
|---|---|---|---|---|---|---|---|---|
| WHITE RIV MASTER | | CE | LRD | DEC 55 | OCE | F | SEP 90 | U |
| BEAVER | WHITE RIV BASIN | CE | LRD | JAN 67 | OCE | F | | |
| TABLE ROCK | WHITE RIV BASIN | CE | LRD | JAN 67 | OCE | F | | |
| BULL SHOALS | WHITE RIVER BASIN | CE | LRD | JAN 67 | OCE | F | | |
| NORFORK | WHITE RIVER BASIN | CE | LRD | JAN 67 | OCE | F | | |
| CLEARWATER | BLACK RIVER | CE | LRD | FEB 73 | SWD | R* | SEP 92 | U |
| GREERS FERRY | LITTLE RED RIVER | CE | LRD | JUN 66 | OCE | F | | |
| ARKANSAS MASTER | | CE | AD | JUN 70 | OCE | F | | |
| PUEBLO (1) | ARKANSAS RIVER | BR | AD | JUN 84 | SWD | F | | |
| TRINIDAD | PURGATORIE RIVER | CE | AD | SEP 85 | SWD | F | | |
| JOHN MARTIN | ARKANSAS RIVER | CE | AD | JAN 83 | SWD | AR | | |
| ARKANSAS MASTER | | CE | TD | OCT 80 | SWD | F | | |
| CHENEY (1) | N.F.NINNESCAH | BR | TD | MAR 66 | OCE | AR | | |
| EL DORADO | WALNUT RIVER | CE | TD | FEB 83 | SWD | F | | |
| KAW | ARKANSAS RIVER | CE | TD | JAN 78 | SWD | F | | |
| GREAT SALT PLAINS | SALT FORK ARK | CE | TD | AUG 71 | SWD | F | | |
| KEYSTONE | ARKANSAS RIVER | CE | TD | APR 65 | OCE | F | | |
| HEYBURN | POLECAT CREEK | CE | TD | DEC 84 | SWD | F | | |
| VERDIGRIS SYSTEM | | | | | | | | |
| TORONTO | VERDIGRIS RIVER | CE | TD | JAN 89 | SWD | F | | |
| FALL RIVER | FALL RIVER | CE | TD | AUG 66 | OCE | F | | |
| ELK CITY | ELK RIVER | CE | TD | AUG 66 | OCE | F | | |
| PEARSON-SKUBITZ-BIG HILL | BIG HILL CREEK | CE | TD | APR 83 | SWD | F | | |
| ODLOGAH | VERDIGRIS RIVER | CE | TD | JUL 76 | SWD | F | | |
| COPAN | CANEY RIVER | CE | TD | MAR 83 | SWD | F | | |
| HULAH | CANEY RIVER | CE | TD | JUN 69 | OCE | AR | | |
| BIRCH | BIRD CREEK | CE | TD | SEP 81 | SWD | F | | |
| SKIATOOK | HOMINY CREEK | CE | TD | DEC 84 | SWD | F | | |
| GRAND SYSTEM | | | | | | | | |
| COUNCIL GROVE | NEOSHO RIVER | CE | TD. | MAY 74 | SWD | F | | |
| MARION | COTTONWOOD RIVER | CE | TD | AUG 74 | SWD | F | | |
| JOHN REDMOND | NEOSHO RIVER | CE | TD | | | | | |
| PENSACOLA (1) | NEOSHO RIVER | GRDA | TD | MAR 65 | OCE | AR | | |
| MARKHAM FERRY (1) | NEOSHO RIVER | GRDA | TD | MAR 65 | OCE | AR | | |
| FORT GIBSON | NEOSHO RIVER | CE | TD | MAR 65 | OCE | AR | | |
| TENKILLER FERRY | ILLINOIS RIVER | CE | TD | MAR 77 | SWD | F | | |

TABLE IV-1

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1990

| RESERVOIR | STREAM | OWNER | DIST | APPROVED | | | SCHEDULED THRU FY 92 | |
|---|---|---|---|---|---|---|---|---|
| CANADIAN SYSTEM | | | | | | | | |
| CONCHAS | CANADIAN RIVER | CE | AD | JAN 68 | OCE | F | | |
| SANFORD (1) | CANADIAN RIVER | BR | TD | FEB 66 | OCE | AR | | |
| NORMAN (1) | LITTLE RIVER | BR | TD | DEC 65 | OCE | F | | |
| OPTIMA | N. CANADIAN RIVER | CE | TD | JAN 72 | SWD | F | | |
| FORT SUPPLY | WOLF CREEK | CE | TD | JAN 72 | SWD | F | | |
| CANTON | N. CANADIAN RIVER | CE | TD | JAN 72 | SWD | F | | |
| ARCADIA | DEEP FORK RIVER | CE | TD | JUN 86 | SWD | F | | |
| EUFAULA | CANADIAN RIVER | CE | TD | NOV 63 | OCE | F | | |
| NEWT GRAHAM PT VI, L&D 18 | ARKANSAS RIVER | CE | TD | AUG 72 | SWD | F | | |
| CHOUTEAU PT V, L&D 17 | ARKANSAS RIVER | CE | TD | AUG 72 | SWD | F | | |
| WEBBERS FALLS PT IV,L&D 16 | ARKANSAS RIVER | CE | TD | JUN 72 | SWD | F | | |
| R.S. KERR PT III, L&D 15 | ARKANSAS RIVER | CE | TD | APR 72 | SWD | F | | |
| W.D. MAYO PT II, L&D 14 | ARKANSAS RIVER | CE | TD | FEB 73 | SWD | F | | |
| WISTER | POTEAU RIVER | CE | TD | JUN 74 | SWD | F | | |
| BLUE MOUNTAIN | PETIT JEAN | CE | LRD | MAR 68 | OCE | F | | |
| NIMROD | FOURCHE LA FAVE | CE | LRD | MAR 68 | OCE | F | | |
| LOCK & DAM 13 | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | SEP 90 | U |
| OZARK-JETA TAYLOR | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| DARDANELLE | ARKANSAS RIVER | CE | LRD | APR 76 | SWD | F | | |
| LOCK & DAM 9 | ARKANSAS RIVER | CE | LRD | APR 76 | SWD | F | | |
| LOCK & DAM 8 TOAD SUCK FERRY | ARKANSAS RIVER | CE | LRD | AUG 74 | SWD | F | | |
| LOCK & DAM 7 MURRAY | ARKANSAS RIVER | CE | LRD | AUG 74 | SWD | F | SEP 91 | U |
| LOCK & DAM 6 DAVID D. TERRY | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| LOCK & DAM 5 | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| LOCK & DAM 4 | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| LOCK & DAM 3 | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| LOCK & DAM 2 | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| LOCK & DAM 1 (ARK POST CANAL) | ARKANSAS RIVER | CE | LRD | SEP 74 | SWD | F | | |
| RED RIVER MASTER | | CE | TD | FEB 63 | OCE | AR | | |
| ALTUS (1) | N. FORK RED | BR | TD | OCT 68 | OCE | F | | |
| MOUNTAIN PARK (1) | OTTER CREEK | BR | TD | MAR 76 | SWD | R* | | |
| TRUSCOTT BRINE LAKE | BLUFF CREEK | CE | TD | | | | | |
| LAKE KEMP (1) | WICHITA RIVER | WCID | TD | JUN 73 | SWD | F | | |
| WAURIKA | BEAVER CREEK | CE | TD | APR 77 | SWD | F | | |
| FOSS (1) | WASHITA RIVER | BR | TD | MAY 61 | OCE | F | | |
| FORT COBB (1) | COBB CREEK | BR | TD | MAR 61 | OCE | F | | |
| ARBUCKLE (1) | ROCK CREEK | BR | TD | SEP 67 | OCE | AR | | |
| TEXOMA | RED RIVER | CE | TD | SEP 82 | SWD | F | | |
| PAT MAYSE | SANDERS CREEK | CE | TD | OCT 67 | OCE | F | | |
| SARDIS | JACKFORK CREEK | CE | TD | AUG 84 | SWD | F | | |
| MCGEE CREEK (1) | MUDDY BOGGY CREEK | BR | TD | OCT 89 | SWD | F | | |
| HUGO | KIAMICHI RIVER | CE | TD | JUL 82 | SWD | AR | | |

TABLE IV-2

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1990

| RESERVOIR | STREAM | OWNER | DIST | APPROVED | | | SCHEDULED THRU FY 92 | |
|---|---|---|---|---|---|---|---|---|
| LITTLE RIV SYS | | | | | | | | |
| PINE CREEK | LITTLE RIVER | CE | TD | JUL 74 | SWD | AR | | |
| BROKEN BOW | MOUNTAIN FORK | CE | TD | NOV 74 | SWD | F | | |
| DEQUEEN | ROLLINS FORK | CE | LRD | JUN 76 | SWD | R | | |
| GILLHAM | COSSATOT RIVER | CE | LRD | JUL 86 | SWD | F | | |
| DIERKS | SALINE RIVER | CE | LRD | AUG 75 | SWD | F | | |
| MILLWOOD | LITTLE RIVER | CE | LRD | NOV 73 | SWD | F | | |
| SULPHUR RIV MASTER | | | | | | | | |
| COOPER | SULPHUR RIVER | CE | FWD | | | | SEP 90 | |
| WRIGHT PATMAN | SULPHUR RIVER | CE | FWD | NOV 74 | LMVD | F | | |
| LAKE O' THE PINES | CYPRESS CREEK | CE | FWD | NOV 74 | LMVD | F | | |
| NECHES RIV MASTER | | CE | FWD | MAR 63 | OCE | AR | | |
| B. A. STEINHAGEN | NECHES RIVER | CE | FWD | FEB 63 | OCE | AR | | |
| SAM RAYBURN | ANGELINA RIVER | CE | FWD | FEB 73 | SWD | AR | SEP 92 | |
| TRINITY RIV MASTER | | CE | FWD | MAY 75 | SWD | P | AUG 90 | |
| BENBROOK | CLEAR FORK | CE | FWD | MAY 75 | SWD | P | AUG 92 | |
| JOE POOL | MOUNTAIN CREEK | CE | FWD | JAN 86 | SWD | P/AR | NOV 89 | |
| RAY ROBERTS | ELM FORK | CE | FWD | JAN 86 | SWD | P/AR | NOV 89 | R |
| LEWISVILLE | ELM FORK | CE | FWD | MAY 75 | SWD | P | SEP 90 | |
| GRAPEVINE | DENTON CREEK | CE | FWD | MAY 75 | SWD | P | APR 90 | |
| LAVON | EAST FORK | CE | FWD | MAY 75 | SWD | P | NOV 92 | |
| NAVARRO MILLS | RICHLAND CREEK | CE | FWD | JUL 64 | OCE | AR | JUN 90 | R |
| BARDWELL | WAXAHACIE CREEK | CE | FWD | JUL 65 | OCE | AR | MAY 90 | R |
| WALLISVILLE | TRINITY RIVER | CE | GD | | | | | |
| BUFFALO BAYOU MASTER | | CE | GD | | | | | |
| BARKER | BUFFALO BAYOU | CE | GD | OCT 72 | SWD | F | | |
| ADDICKS | BUFFALO BAYOU | CE | GD | OCT 72 | SWD | F | | |
| BRAZOS RIV MASTER | | CE | FWD | MAR 73 | SWD | R* | | |
| WHITNEY | BRAZOS RIVER | CE | FWD | MAY 75 | SWD | F | | |
| AQUILLA | AQUILLA CREEK | CE | FWD | JUL 88 | SWD | F | | |
| PROCTOR | LEON RIVER | CE | FWD | APR 74 | SWD | F | OCT 92 | U |
| BELTON | LEON RIVER | CE | FWD | MAY 76 | SWD | F | | |
| STILLHOUSE HOLLOW | LAMPASAS RIVER | CE | FWD | FEB 79 | SWD | F | | |
| GEORGETOWN | N.F.SAN GABRIEL | CE | FWD | JUN 80 | SWD | P | MAR 90 | R |
| GRANGER | SAN GABRIEL | CE | FWD | NOV82 | SWD | R | FEB 90 | R |
| WACO | BOSQUE RIVER | CE | FWD | AUG 73 | SWD | F | | |
| SOMERVILLE | YEGUA CREEK | CE | FWD | NOV 73 | SWD | F | | |

TABLE IV-3

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1990

| RESERVOIR | STREAM | OWNER | DIST | APPROVED | | | SCHEDULED THRU FY 92 | |
|---|---|---|---|---|---|---|---|---|
| COLORADO RIV MASTER | | CE | FWD | | | | | |
| HORDS CREEK | HORDS CREEK | CE | FWD | MAY 62 | OCE | AR | | |
| O.C. FISHER | N. CONCHO | CE | FWD | DEC 62 | OCE | AR | | |
| TWIN BUTTES (1) | S. CONCHO | BR | FWD | SEP 66 | OCE | P/FR | SEP 90 | |
| MARSHALL FORD (1) | COLORADO RIVER | BR | FWD | MAY 80 | SWD | P/FR | JUL 90 | |
| GUADALUPE RIV MASTER | | CE | FWD | JAN 66 | OCE | AR | | |
| CANYON | GUADALUPE RIVER | CE | FWD | MAY 73 | SWD | F | | |
| RIO GRANDE MASTER | | CE | AD | FEB 67 | OCE | F | | |
| ABIQUIU | RIO CHAMA | CE | AD | JUN 82 | SWD | F | MAR 92 | U |
| COCHITI | RIO GRANDE | CE | AD | JUN 81 | SWD | F | SEP 91 | U |
| GALISTEO | GALISTEO CREEK | CE | AD | APR 68 | OCE | F | | |
| JEMEZ CANYON | JEMEZ RIVER | CE | AD | AUG 84 | SWD | F | NOV 92 | U |
| PLATORO (1) | CONEJOS RIVER | BR | AD | MAY 64 | OCE | F | JUN 91 | U |
| PECOS RIV MASTER | | CE | AD | NOV 77 | SWD | AR | | |
| SANTA ROSA | PECOS RIVER | CE | AD | SEP 81 | SWD | F | | |
| SUMNER (1) | PECOS RIVER | BR | AD | JUL 84 | SWD | AR | JUL 90 | U |
| TWO RIVERS | RIO HONDO | CE | AD | JUN 64 | OCE | F | | |
| BRANTLEY (1) | PECOS RIVER | CE | AD | | | | JUN 90 | |
| NAVAJO (1) | SAN JUAN RIVER | BR | AD | JUN 70 | OCE | F | OCT 90 | U |

NOTES:

(1) = Section 7 project, flood control regulation by CE.
AR = Approved, comments to be answered.
F = Complete, comments have been answered and approved.
FR = Published in Federal Register.
P = Plan.
R = Revision or answer to comments.
R* = Returned without approval.
U = Update of existing approved manual.
GRDA = Grand River Dam Authority.
WCID = Wichita County Water Improvement District.
LCRA = Lower Colorado River Authority.
BR = Bureau of Reclamation.

TABLE IV-4

SOUTHWESTERN DIVISION
SCHEDULE OF HIGH PRIORITY WATER CONTROL PLANS
FY 90 THRU FY 95

| FY | DISTRICT | | | | |
|---|---|---|---|---|---|
| | ALBUQUERQUE | FORT WORTH | GALVESTON | LITTLE ROCK | TULSA |
| 90 | BRANTLEY | BARDWELL | | WHITE RIVER MAS | PENSACOLA |
| | SUMNER | NAVARRO MILLS | | L & D #13 | KEYSTONE |
| | | GRAPEVINE | | | |
| | | GRANGER | | | |
| | | GEORGETOWN | | | |
| | | MARSHALL FORD | | | |
| 91 | PLATORA | TRINITY MAS | | L & D #7 | HULAH |
| | NAVAJO | TWIN BUTTES | | | ALTUS |
| | COCHITI | RAY ROBERTS | | | |
| | | JOE POOL | | | |
| | | LEWISVILLE | | | |
| 92 | ABIQUIU | BENBROOK | ADDICKS | CLEARWATER | KAW |
| | JEMEZ CANYON | SAM RAYBURN | BARKER | | HUDSON |
| | | PROCTOR | | | FT GIBSON |
| | | LAVON | | | FOSS |
| | | | | | FALL RIVER |
| | | | | | EUFAULA |
| | | | | | TOM STEED |
| 93 | CONCHAS | LAKE O' PINES | | BULL SHOALS | TEXOMA |
| | TWO RIVERS | NECHES RIV MAS | | TABLE ROCK | OOLOGAH |
| | | DAM B | | | |
| | | BRAZOS MAS | | | |
| 94 | TRINIDAD | COLORADO MAS | | GREERS FERRY | ELK CITY |
| | PECOS MAS | GUADALUPE MAS | | L&D #9 | THUNDERBIRD |
| | | WHITNEY | | | GREAT SALT |
| | | SOMMERVILLE | | | |
| 95 | RIO GRANDE MAS | WACO | | BEAVER | RED RIV MAS |
| | | BELTON | | NORFORK | CHENEY |
| | | HORDS CREEK | | | TRUSCOTT |
| | | WRIGHT PATMAN | | | MARION |
| | | | | | COUNCIL GROVE |
| | | | | | FORT COBB |

'Revised DEC 14 1989
SCH90-95

TABLE IV

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1990



| BASIN/PROJECT | STREAM | DIST | SCHEDULED COMPLETION DATE | STATUS/DATE |
|---|---|---|---|---|
| WHITE RIV BASIN | | LRD | AUGUST 1990 | FINAL PLAN/AUG 89 |
| BEAVER | WHITE RIVER | LRD | | |
| TABLE ROCK | WHITE RIVER | LRD | | |
| BULL SHOALS | WHITE RIVER | LRD | | |
| NORFORK | WHITE RIVER | LRD | | |
| CLEARWATER | BLACK RIVER | LRD | | |
| GREERS FERRY | LITTLE RED RIVER | LRD | | |
| UPPER ARKANSAS RIVER BASIN | | AD | AUGUST 1989 | FINAL PLAN/NOV 89 |
| TRINIDAD | PURGATORIE RIVER | AD | | |
| JOHN MARTIN | ARKANSAS RIVER | AD | | |
| MID-ARKANSAS RIVER BASIN | | TD | DECEMBER 1990 | DRAFT PLAN/JAN 90 |
| EL DORADO | WALNUT RIVER | TD | | |
| KAW | ARKANSAS RIVER | TD | | |
| GREAT SALT PLAINS | SALT FORK ARK | TD | | |
| KEYSTONE | ARKANSAS RIVER | TD | | |
| HEYBURN | POLECAT CREEK | TD | | |
| UPPER VERDIGRIS RIVER BASIN | | TD | JULY 1990 | DRAFT PLAN/JAN 90 |
| TORONTO | VERDIGRIS RIVER | TD | | |
| FALL RIVER | FALL RIVER | TD | | |
| ELK CITY | ELK RIVER | TD | | |
| PEARSON-SKUBITZ-BIG HILL | BIG HILL CREEK | TD | | |
| LOWER VERDIGRIS RIVER BASIN | | TD | MARCH 1990 | FINAL PLAN/AUG 89 |
| COPAN | CANEY RIVER | TD | | |
| HULAH | CANEY RIVER | TD | | |
| BIRCH | BIRD CREEK | TD | | |
| SKIATOOK | HOMINY CREEK | TD | | |
| OOLOGAH | VERDIGRIS RIVER | TD | | |
| UPPER NEOSHO RIVER BASIN | | TD | AUGUST 1989 | FINAL PLAN/AUG 89 |
| COUNCIL GROVE | NEOSHO RIVER | TD | | |
| MARION | COTTONWOOD RIVER | TD | | |
| JOHN REDMOND | NEOSHO RIVER | TD | | |
| LOWER ARK RIVER BASIN | | TD | AUGUST 1989 | FINAL PLAN/AUG 89 |
| FORT GIBSON | NEOSHO RIVER | TD | | |
| TENKILLER FERRY | ILLINOIS RIVER | TD | | |
| WISTER | POTEAU RIVER | TD | | |

TABLE IV

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1990



| BASIN/PROJECT | STREAM | DIST | SCHEDULED COMPLETION DATE | STATUS/DATE |
|---|---|---|---|---|
| UPPER CANADIAN RIVER BASIN | | AD | MARCH 1990 | DRAFT PLAN/DEC 89 |
| CONCHAS | CANADIAN RIVER | AD | | |
| LOWER CANADIAN RIVER BASIN | | TD | JULY 1990 | DRAFT PLAN/NOV 89 |
| OPTIMA | N. CANADIAN RIVER | TD | | |
| FORT SUPPLY | WOLF CREEK | | | |
| CANTON | N. CANADIAN RIVER | TD | | |
| ARCADIA | DEEP FORK RIVER | TD | | |
| EUFAULA | CANADIAN RIVER | TD | | |
| NAVIGATION PROJECTS | | TD | DECEMBER 1990 | DRAFT PLAN/JAN 90 |
| NEWT GRAHAM, L&D 13 | ARKANSAS RIVER | TD | | |
| CHOUTEAU,L&D 17 | ARKANSAS RIVER | TD | | |
| WEBBERS FALLS,L&D 16 | ARKANSAS RIVER | TD | | |
| R.S. KERR,L&D 15 | ARKANSAS RIVER | TD | | |
| W.D. MAYO,L&D 14 | ARKANSAS RIVER | TD | | |
| LOWER ARKANSAS RIVER BASIN | | LRD | MARCH 1990 | DRAFT PLAN/DEC 89 |
| BLUE MOUNTAIN | PETIT JEAN | LRD | | |
| NIMROD | FOURCHE LA FAVE | LRD | | |
| OZARK-JETA TAYLOR | ARKANSAS RIVER | LRD | | |
| DARDANELLE | ARKANSAS RIVER | LRD | | |
| NAVIGATION L&D'S(10) | ARKANSAS RIVER | LRD | | |
| UPPER RED RIVER BASIN | | TD | MARCH 1990 | FINAL PLAN/AUG 89 |
| TEXOMA | RED RIVER | TD | | |
| WAURIKA | BEAVER CREEK | TD | | |
| MID-RED RIVER BASIN | | TD | JULY 1990 | DRAFT PLAN/JAN 90 |
| PAT MAYSE | SANDERS CREEK | TD | | |
| SARDIS | JACKFORK CREEK | TD | | |
| HUGO | KIAMICHI RIVER | TD | | |
| PINE CREEK | LITTLE RIVER | TD | | |
| BROKEN BOW | MOUNTAIN FORK | TD | | |
| LITTLE RIVER BASIN | | TD | NOVEMBER 1989 | FINAL PLAN/NOV 89 |
| DEQUEEN | ROLLING FORK | LRD | | |
| GILLHAM | COSSATOT RIVER | LRD | | |
| DIERKS | SALINE RIVER | LRD | | |
| MILLWOOD | LITTLE RIVER | LRD | | |

TABLE IV

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1990



| BASIN/PROJECT | STREAM | DIST | SCHEDULED COMPLETION DATE | STATUS/DATE |
|---|---|---|---|---|
| LOWER RED RIVER BASIN | | FWD | AUGUST 1990 | DRAFT PLAN/JUL 89 |
| COOPER | SULPHUR RIVER | FWD | | |
| WRIGHT PATMAN | SULPHUR RIVER | FWD | | |
| LAKE O' THE PINES | CYPRESS CREEK | FWD | | |
| NECHES RIV BASIN | | FWD | FEBRUARY 1991 | DRAFT PLAN/DEC 89 |
| B. A. STEINHAGEN | NECHES RIVER | FWD | | |
| SAM RAYBURN | ANGELINA RIVER | FWD | | |
| TRINITY RIV BASIN | | FWD | AUGUST 1989 | FINAL PLAN/AUG 89 |
| BENBROOK | CLEAR FORK | FWD | | |
| JOE POOL | MOUNTAIN CREEK | FWD | | |
| RAY ROBERTS | ELM FORK | FWD | | |
| LEWISVILLE | ELM FORK | FWD | | |
| GRAPEVINE | DENTON CREEK | FWD | | |
| LAVON | EAST FORK | FWD | | |
| NAVARRO MILLS | RICHLAND CREEK | FWD | | |
| BARDWELL | WAXAHACIE CREEK | FWD | | |
| BRAZOS RIV BASIN | | FWD | MAY 1990 | DRAFT PLAN/APR 89 |
| WHITNEY | BRAZOS RIVER | FWD | | |
| AQUILLA | AQUILLA CREEK | FWD | | |
| PROCTOR | LEON RIVER | FWD | | |
| BELTON | LEON RIVER | FWD | | |
| STILLHOUSE HOLLOW | LAMPASAS RIVER | FWD | | |
| GEORGETOWN | N.F.SAN GABRIEL | FWD | | |
| GRANGER | SAN GABRIEL | FWD | | |
| WACO | BOSQUE RIVER | FWD | | |
| SOMERVILLE | YEQUA CREEK | FWD | | |
| COLORADO RIV BASIN | | FWD | NOVEMBER 1990 | DRAFT PLAN/OCT 89 |
| HORDS CREEK | HORDS CREEK | FWD | | |
| O.C. FISHER | N. CONCHO | FWD | | |
| GUADALUPE RIV BASIN | | FWD | MAY 1991 | DRAFT PLAN/DEC 89 |
| CANYON | GUADALUPE RIVER | FWD | | |
| RIO GRANDE RIVER BASIN | | AD | JANUARY 1990 | |
| ABIQUIU | RIO CHAMA | AD | | |
| COCHITI | RIO GRANDE | AD | | |
| GALISTEO | GALISTEO CREEK | AD | | |
| JEMEZ CANYON | JEMEZ RIVER | AD | | |
| PECOS RIV BASIN | | AD | FEBRUARY 1990 | DRAFT PLAN/APR 89 |
| SANTA ROSA | PECOS RIVER | AD | | |

# SECTION V - REGULATION OF MULTI-PURPOSE PROJECTS WITH HYDROPOWER

SECTION V

## HYDROPOWER GENERATION AT SOUTHWESTERN DIVISION PROJECTS

The 17 Hydropower Projects are listed in Table 1. Generation by project for the last five fiscal years are shown in Table 2. Also, generation by the projects, since impoundment, is shown on the following graphs.

TABLE 1

| Projects | Basin | Stream | No. Units | Total Capacity MW | Plate No. |
|---|---|---|---|---|---|
| Beaver | White | White | 2 | 112 | V-1 |
| Table Rock | White | White | 4 | 200 | V-2 |
| Bull Shoals | White | White | 8 | 340 | V-3 |
| Norfork | White | North Fork | 2 | 70 | V-4 |
| Greers Ferry | White | Little Red | 2 | 96 | V-5 |
| Keystone | Arkansas | Arkansas | 2 | 70 | V-6 |
| Ft. Gibson | Arkansas | Grand | 4 | 45 | V-7 |
| Webbers Falls | Arkansas | Arkansas | 3 | 60 | V-8 |
| Tenkiller | Arkansas | Illinois | 2 | 34 | V-9 |
| Eufaula | Arkansas | S. Canadian | 3 | 90 | V-10 |
| R.S. Kerr | Arkansas | Arkansas | 4 | 110 | V-11 |
| Ozark-Jeta Taylor | Arkansas | Arkansas | 5 | 100 | V-12 |
| Dardanelle | Arkansas | Arkansas | 4 | 124 | V-13 |
| Denison | Red | Red | 2 | 70 | V-14 |
| Broken Bow | Red | Mountain Fork | 2 | 100 | V-15 |
| Sam Rayburn | Neches | Angelina | 2 | 52 | V-16 |
| Town Bluff | Neches | Neches | 2 | 8 | V-17 |
| Whitney | Brazos | Brazos | 2 | 30 | V-18 |

TABLE 2
Fiscal Years
(1,000 GWH)

| Projects | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|
| Beaver | 222.5 | 214.5 | 155.1 | 192.5 | 160.9 |
| Table Rock | 886.0 | 645.9 | 432.2 | 636.3 | 479.1 |
| Bull Shoals | 1397.9 | 875.0 | 566.8 | 897.7 | 705.4 |
| Norfork | 396.1 | 214.7 | 126.5 | 223.9 | 240.6 |
| Greers Ferry | 315.8 | 148.9 | 105.7 | 201.8 | 216.6 |
| Keystone | 306.5 | 333.0 | 500.9 | 312.4 | 254.8 |
| Ft. Gibson | 321.8 | 294.9 | 286.7 | 201.5 | 212.0 |
| Webbers Falls | 320.7 | 350.9 | 286.9 | 197.8 | 263.5 |
| Tenkiller Ferry | 176;3 | 174.1 | 147.5 | 134.7 | 121.3 |
| Eufaula | 360.0 | 336.1 | 461.2 | 282.4 | 304.1 |
| R.S. Kerr | 750.7 | 725.8 | 772.9 | 536.3 | 547.9 |
| Ozark-Jeta Taylor | 437.1 | 488.0 | 341.1 | 334.6 | 407.8 |
| Dardanelle | 823.5 | 799.6 | 830.1 | 600.6 | 702.6 |
| Denison | 343.0 | 294.5 | 533.2 | 291.3 | 309.6 |
| Broken Bow | 229.6 | 147.4 | 93.9 | 142.4 | 175.1 |
| Sam Rayburn | 97.8 | 105.6 | 147.4 | 112.4 | 125.7 |
| Town Bluff | - | - | - | - | 81.0 |
| Whitney | 57.1 | 50.8 | 109.9 | 17.5 | 46.7 |

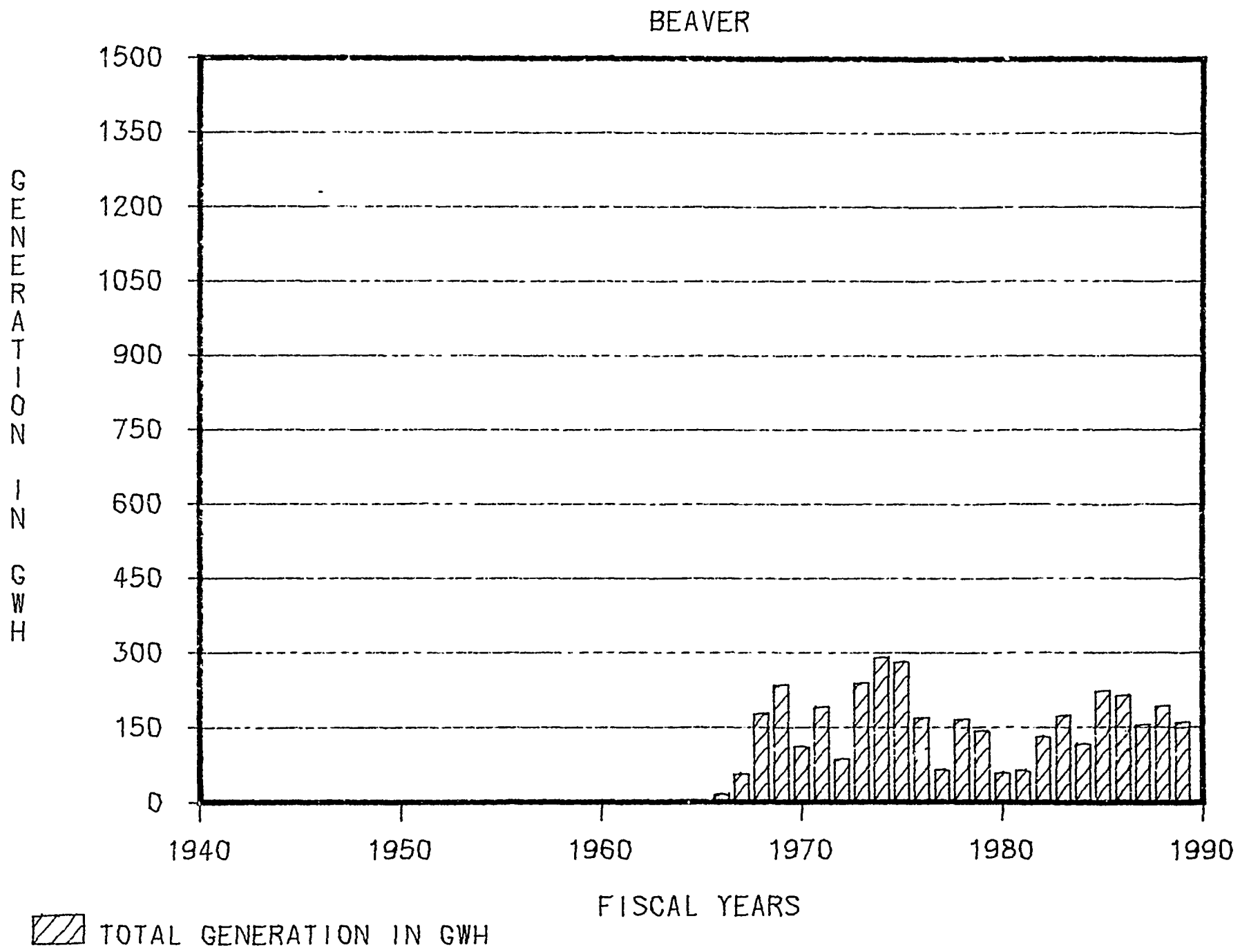
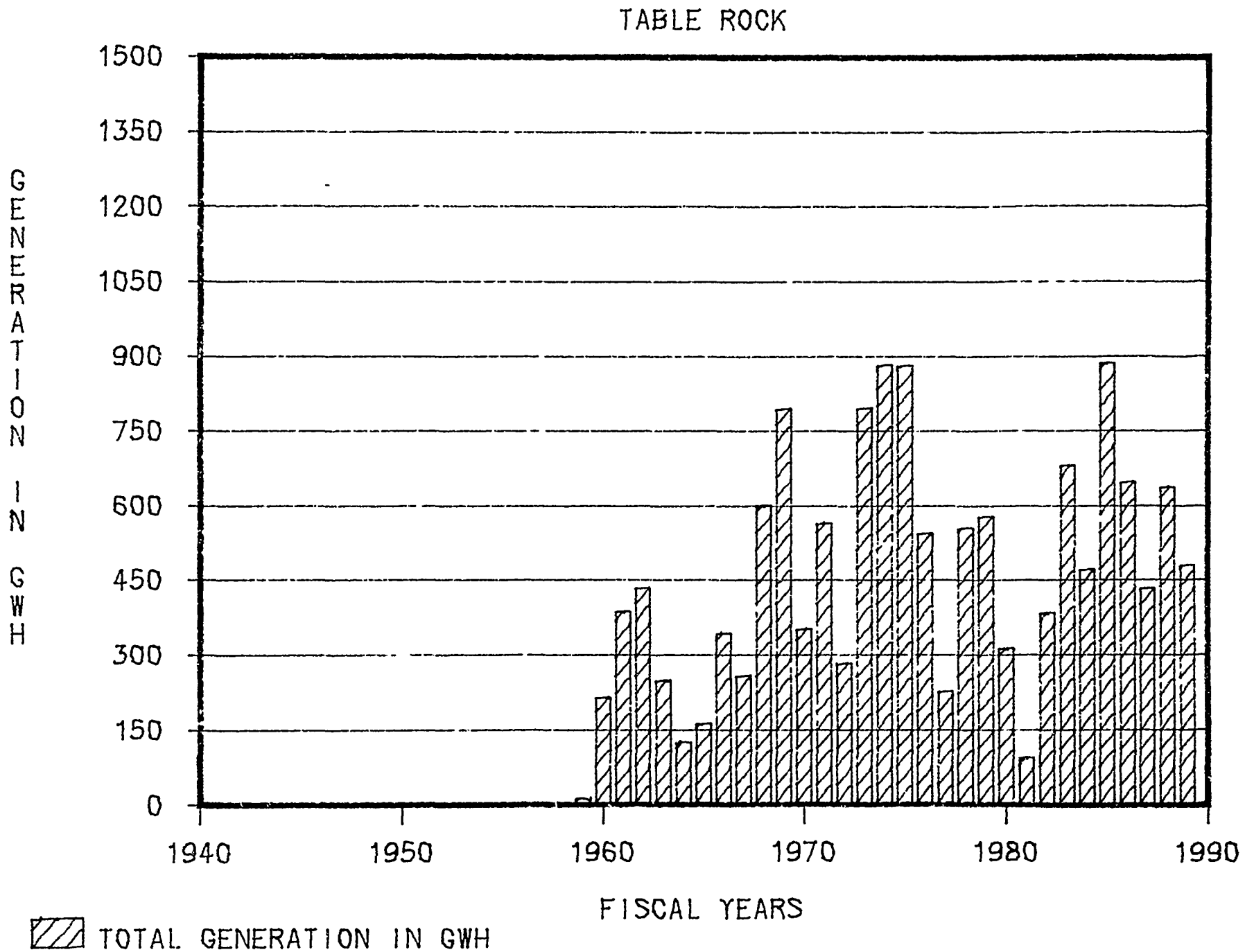

BEAVER
1500
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 1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1350
1200
1050
900
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1950
1960
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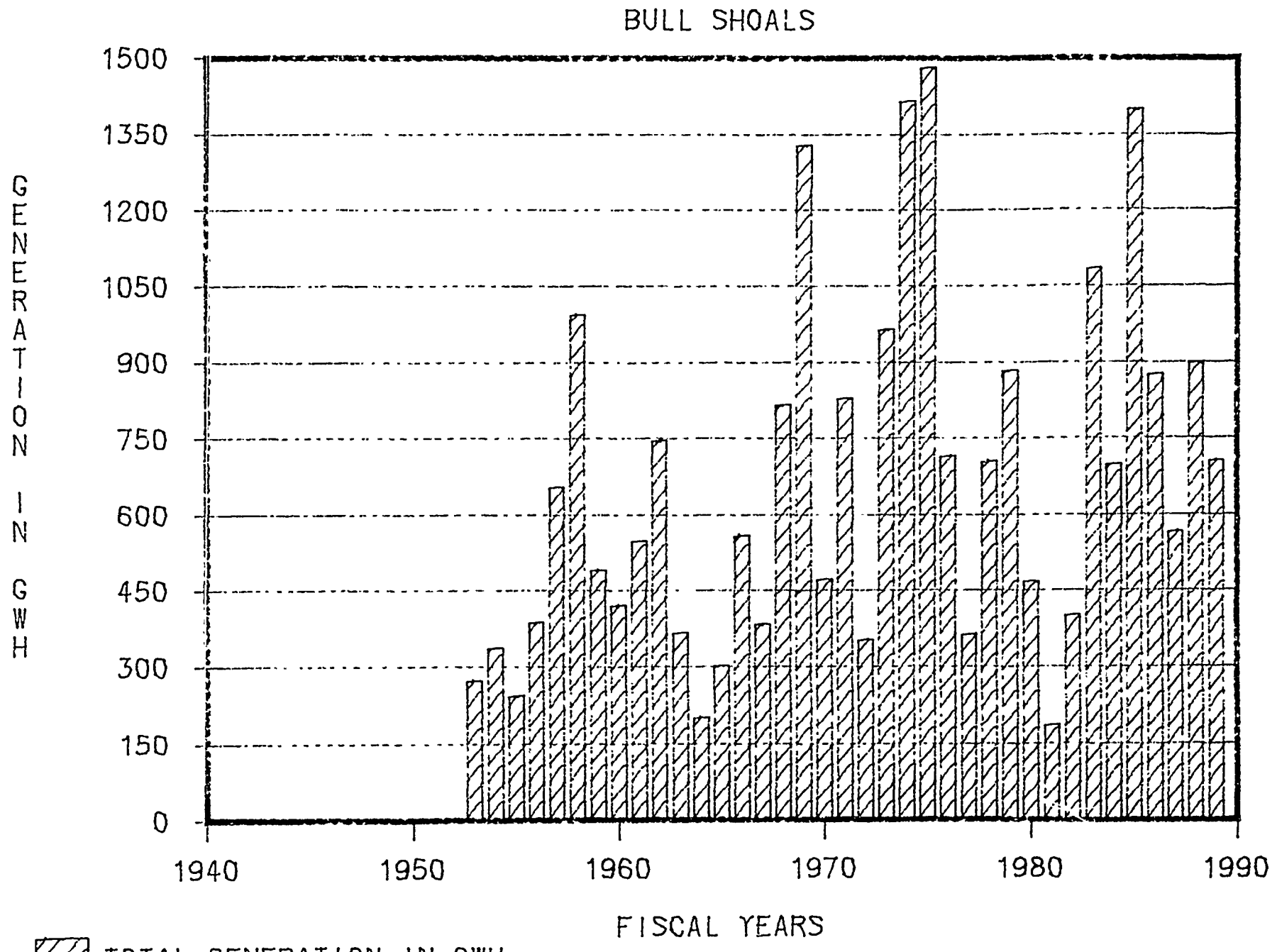
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 2


BULL SHOALS
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1350
1200
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750
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GENERATION IN GWH
1940
1950
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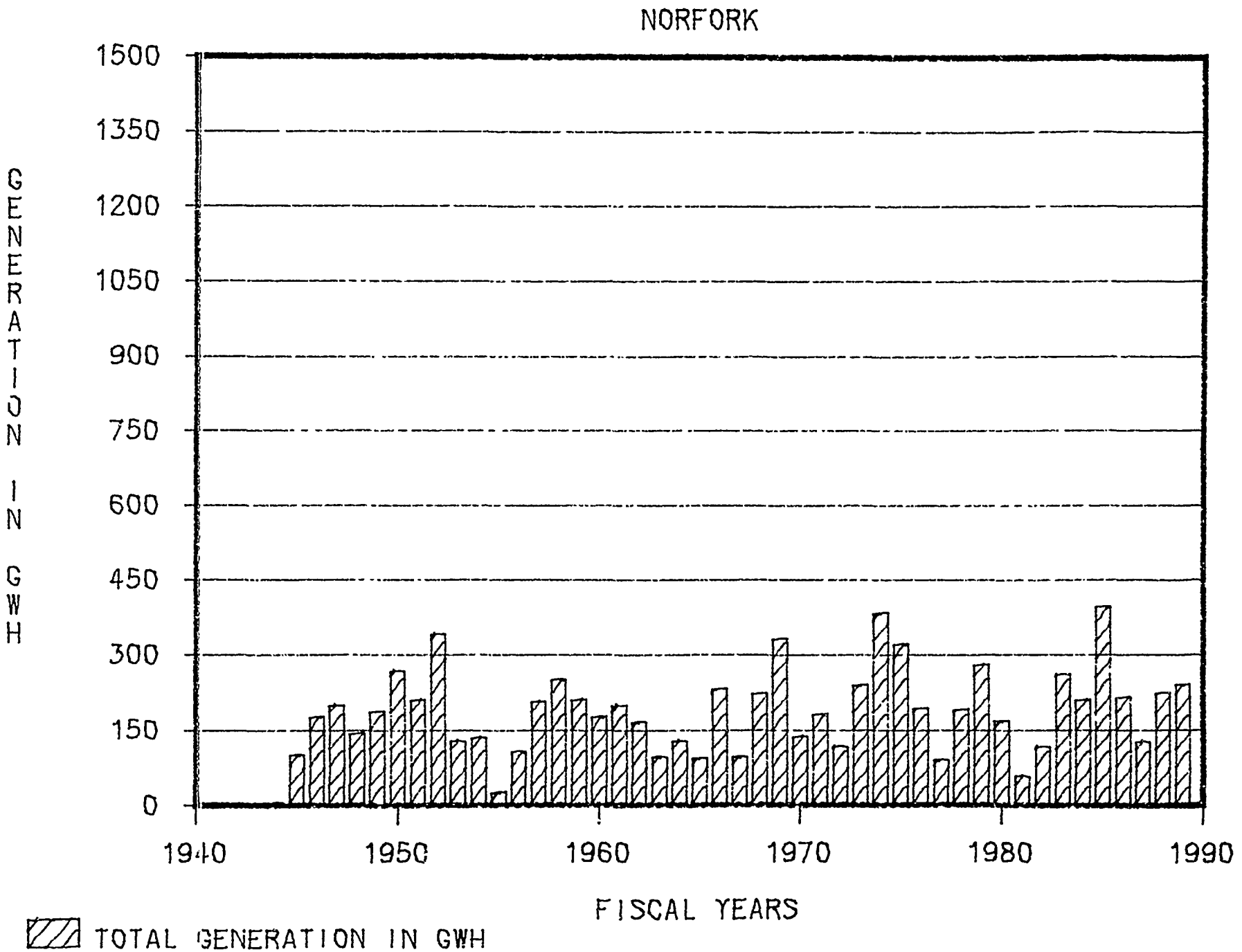
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 3


NORFORK
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1350
1200
1050
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150
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GENERATION IN GWH
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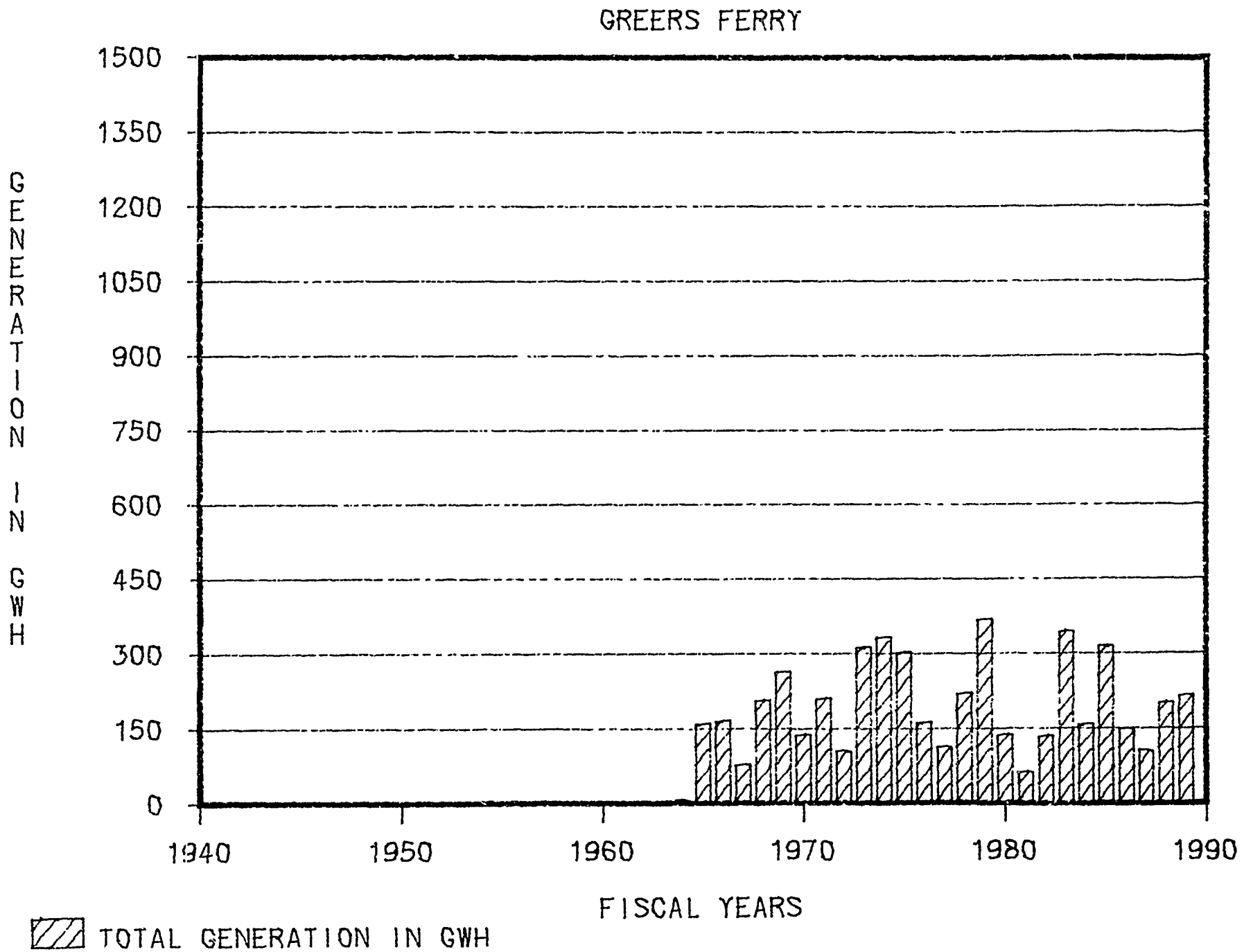
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 4


GREERS FERRY
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1350
1200
1050
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150
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GENERATION IN GWH
1940
1950
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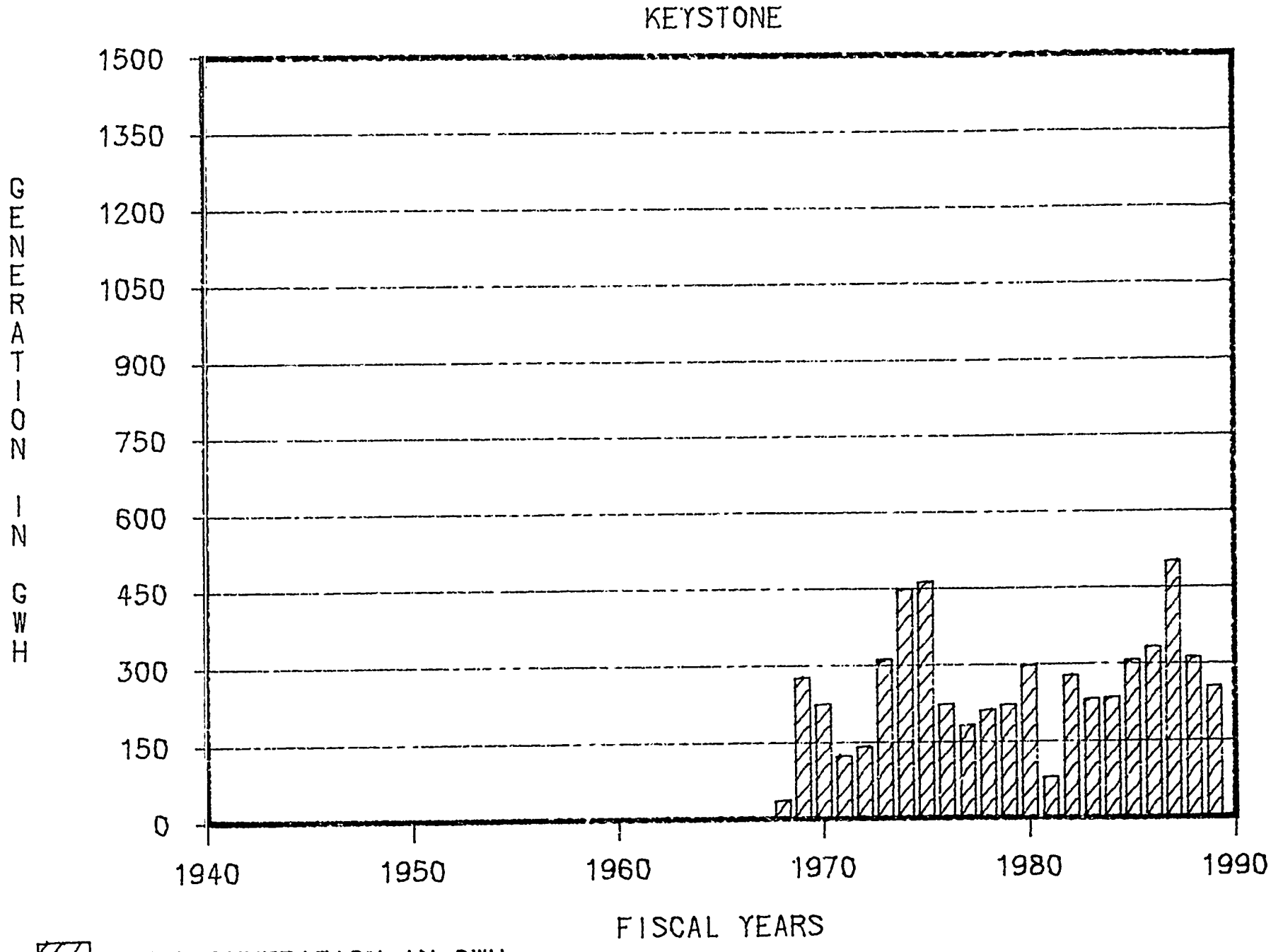
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 5


KEYSTONE
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1350
1200
1050
900
750
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450
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150
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GENERATION IN GWH
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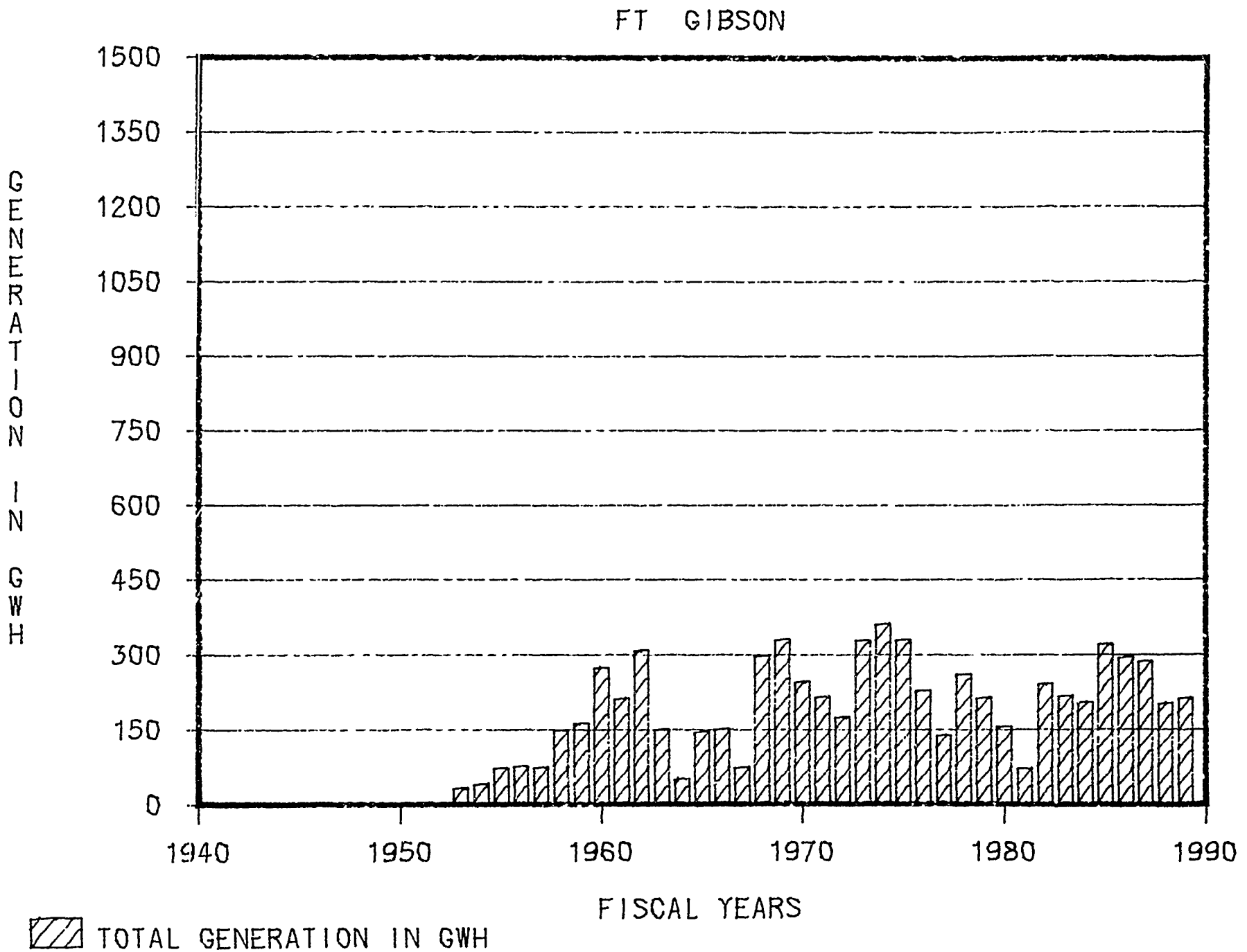
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 6


FT GIBSON
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1350
1200
1050
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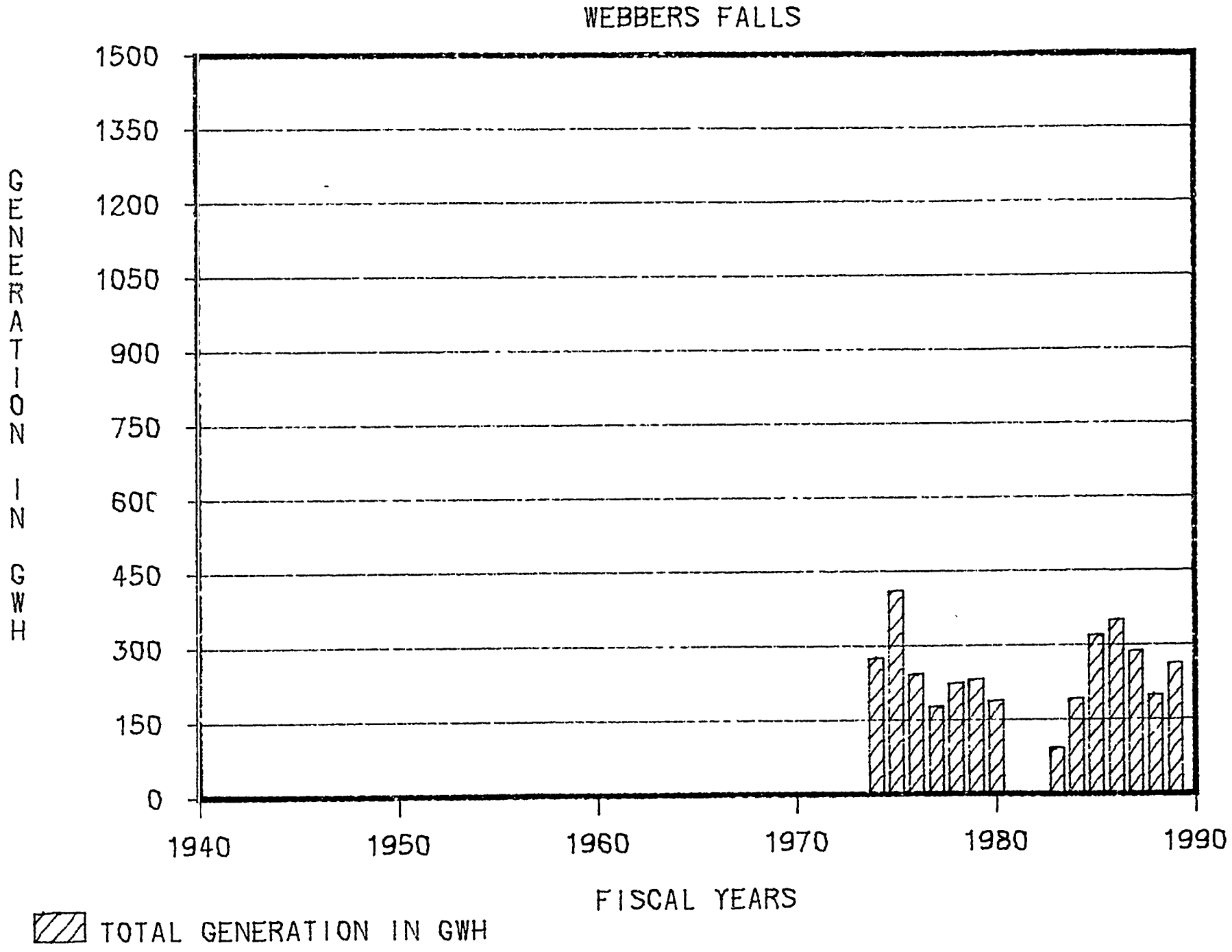
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 7


WEBBERS FALLS
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1350
1200
1050
900
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450
300
150
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GENERATION IN GWH
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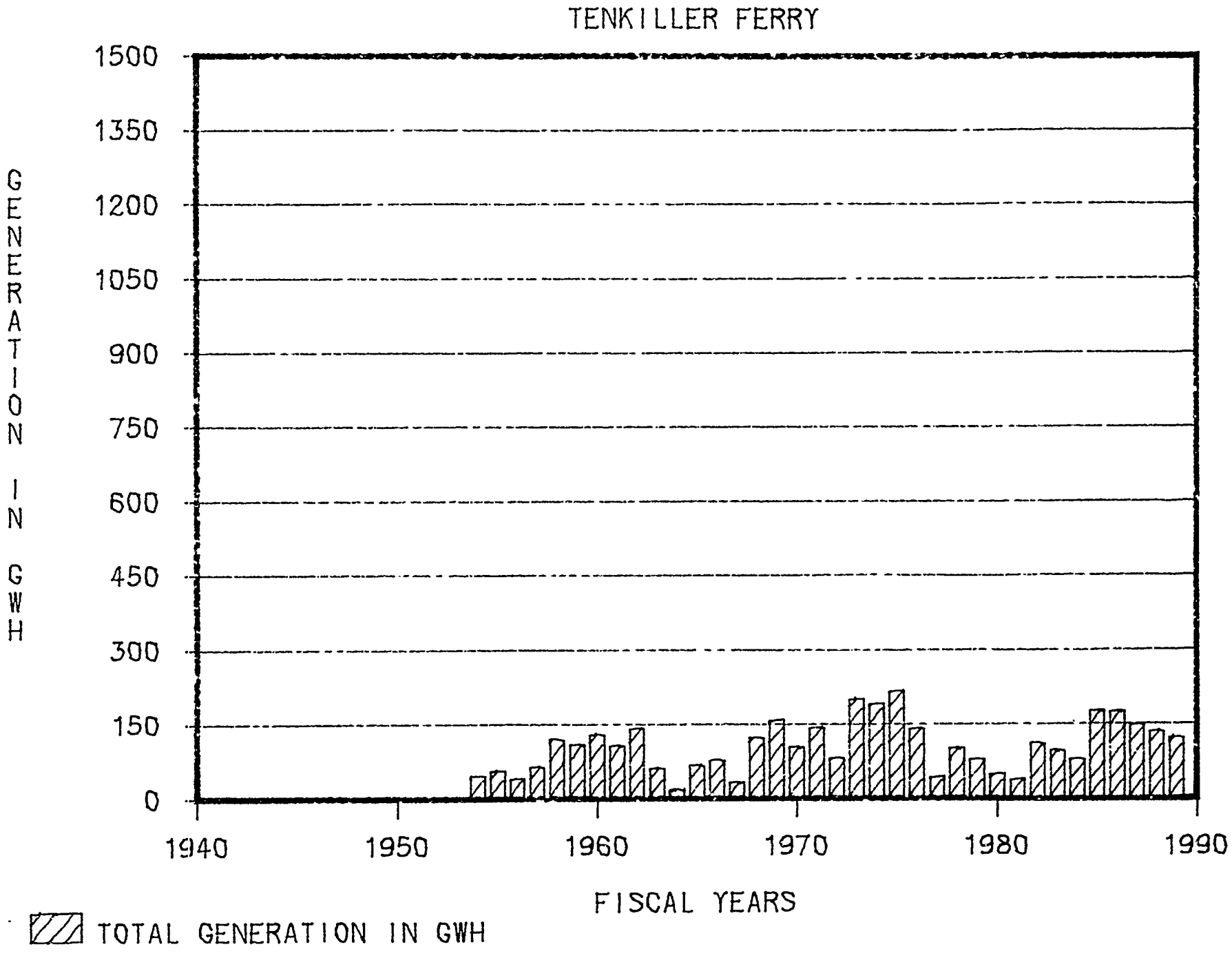
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 8


TENKILLER FERRY
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1200
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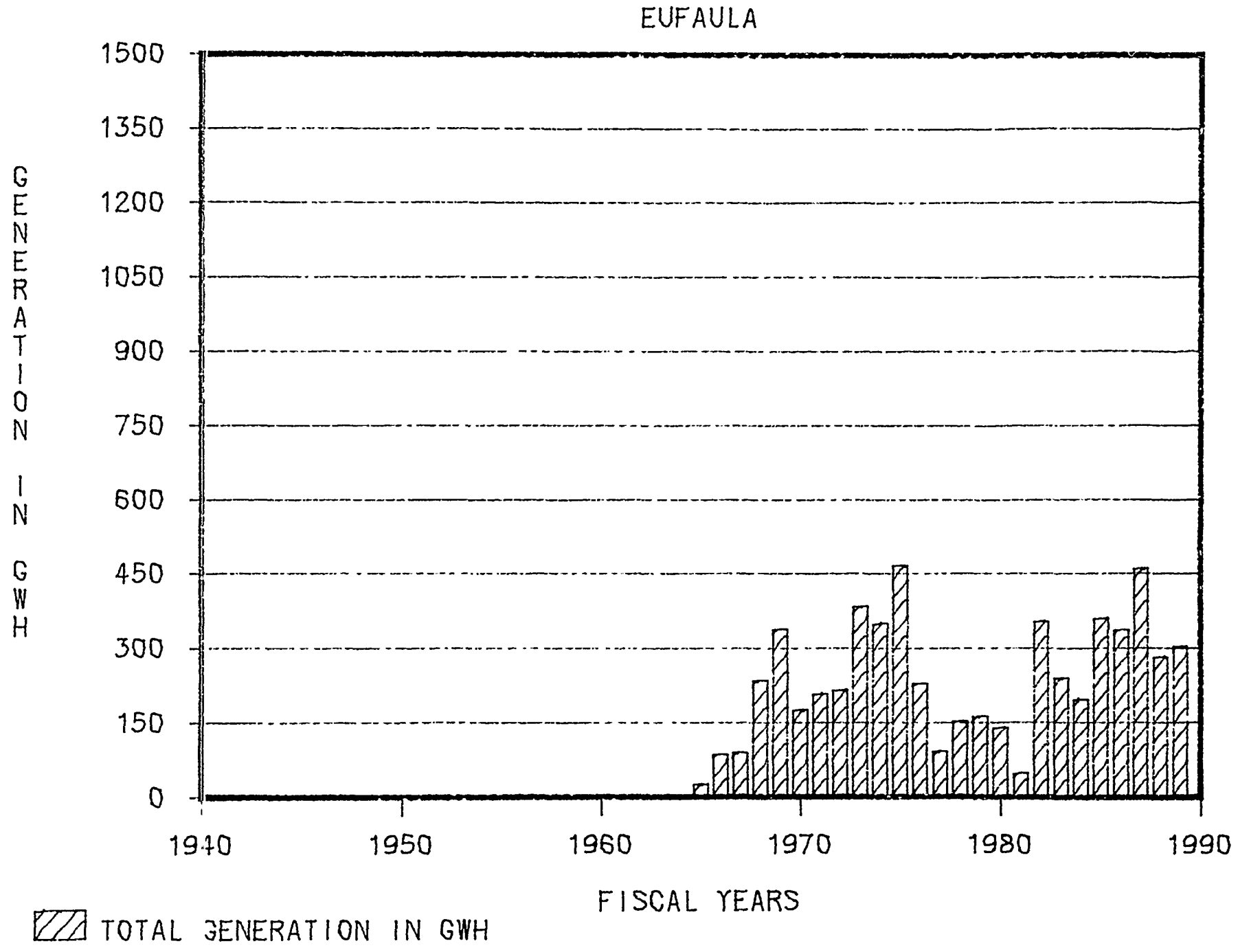
1990
FISCAL YEARS
TOTAL GENERATION IN GWH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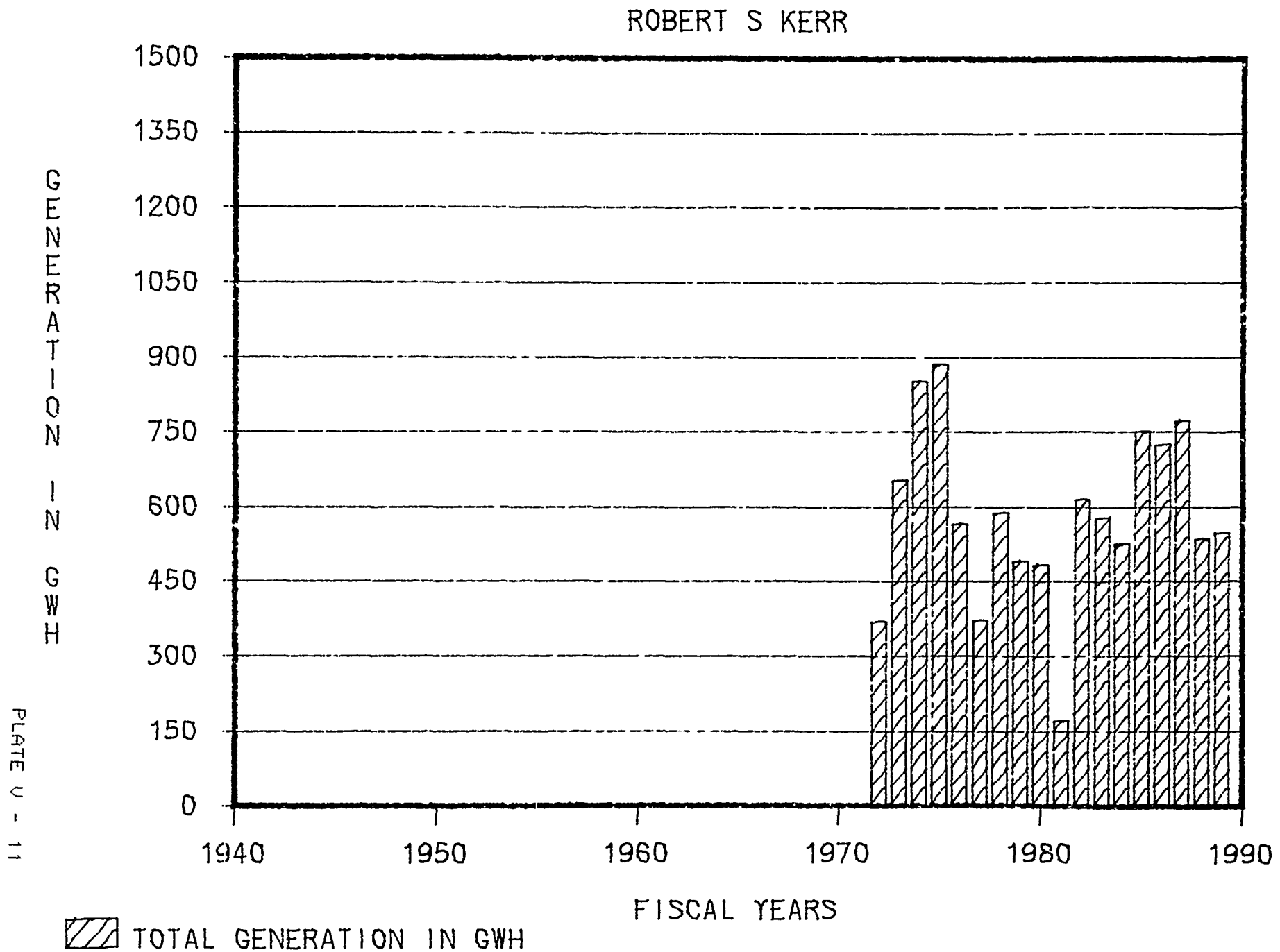
1990
FISCAL YEARS
TOTAL GENERATION IN GWH


ROBERT S KERR
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1350
1200
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150
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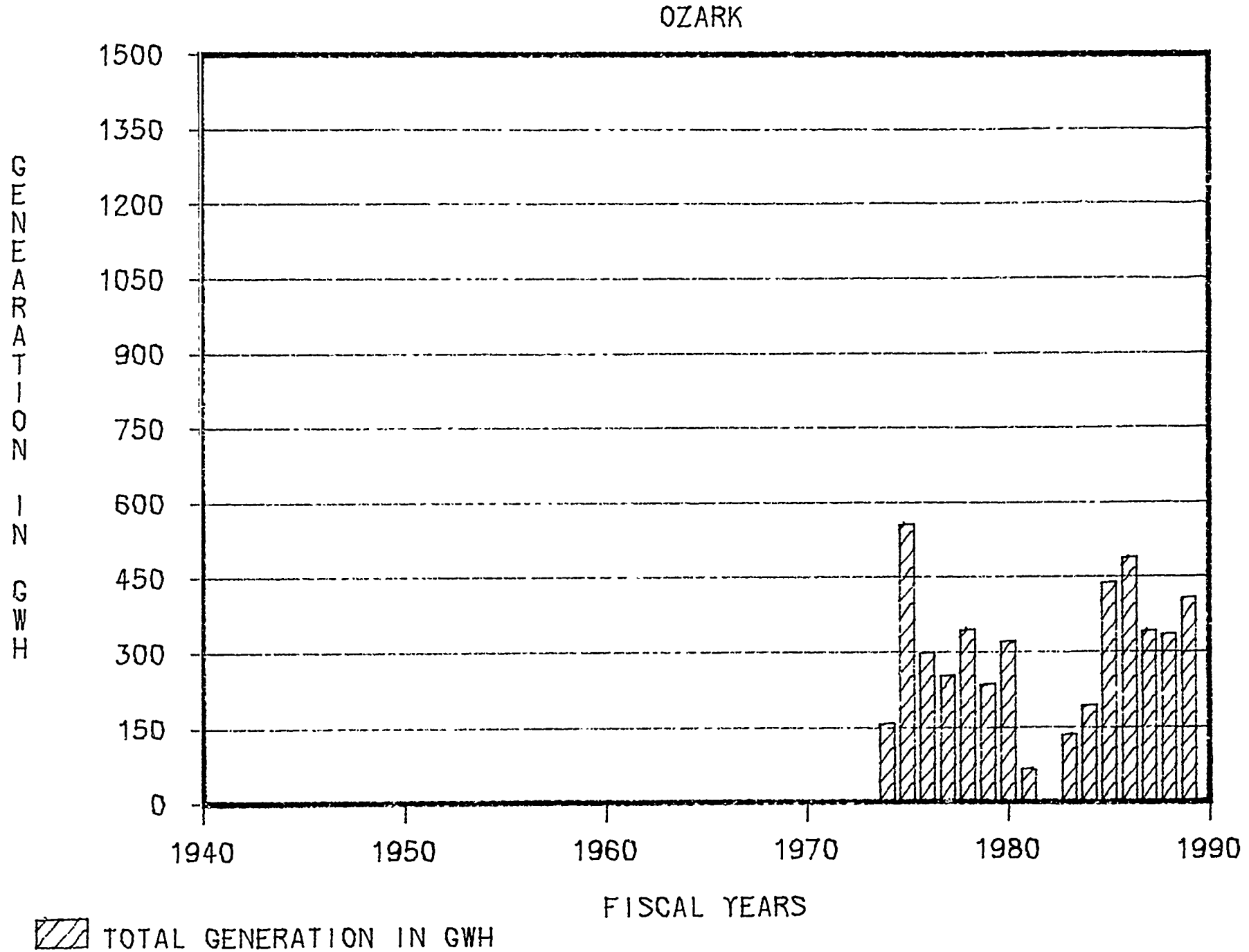
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH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1050
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GENEARATION IN GWH
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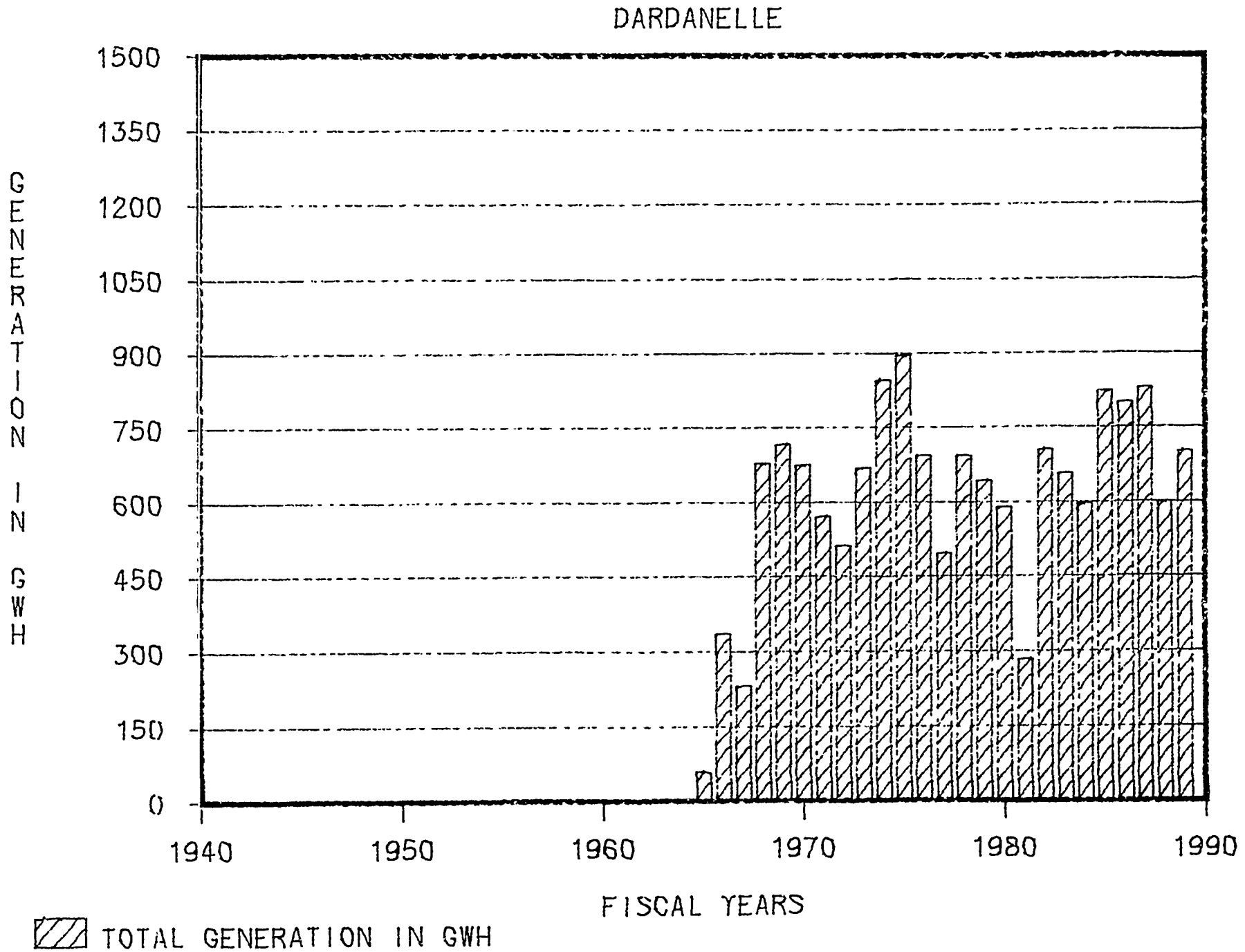
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH


DARDANELLE
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1350
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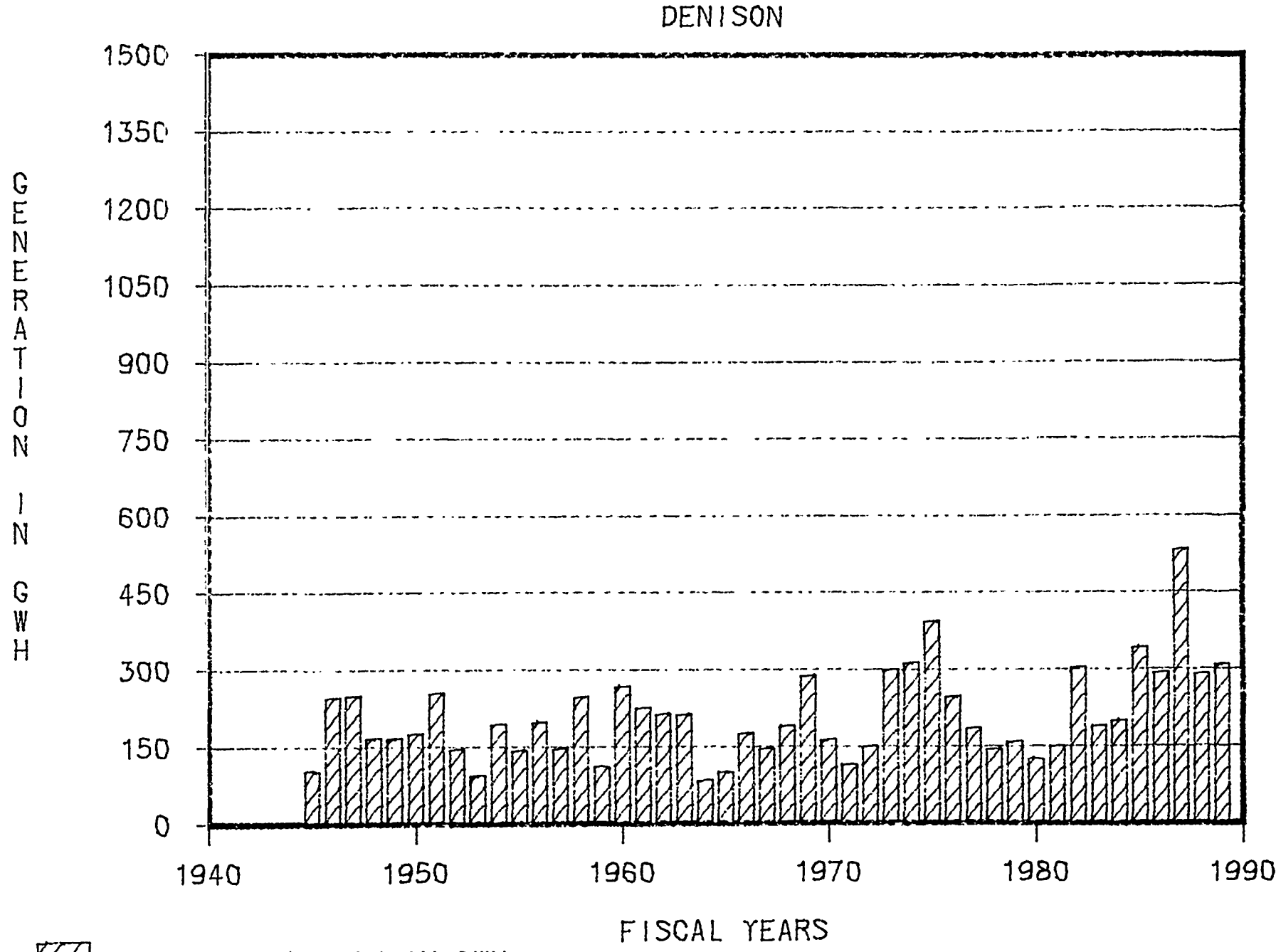
1990
FISCAL YEARS
TOTAL GENERATION IN GWH


DENISON
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GENERATION IN GWH
1940
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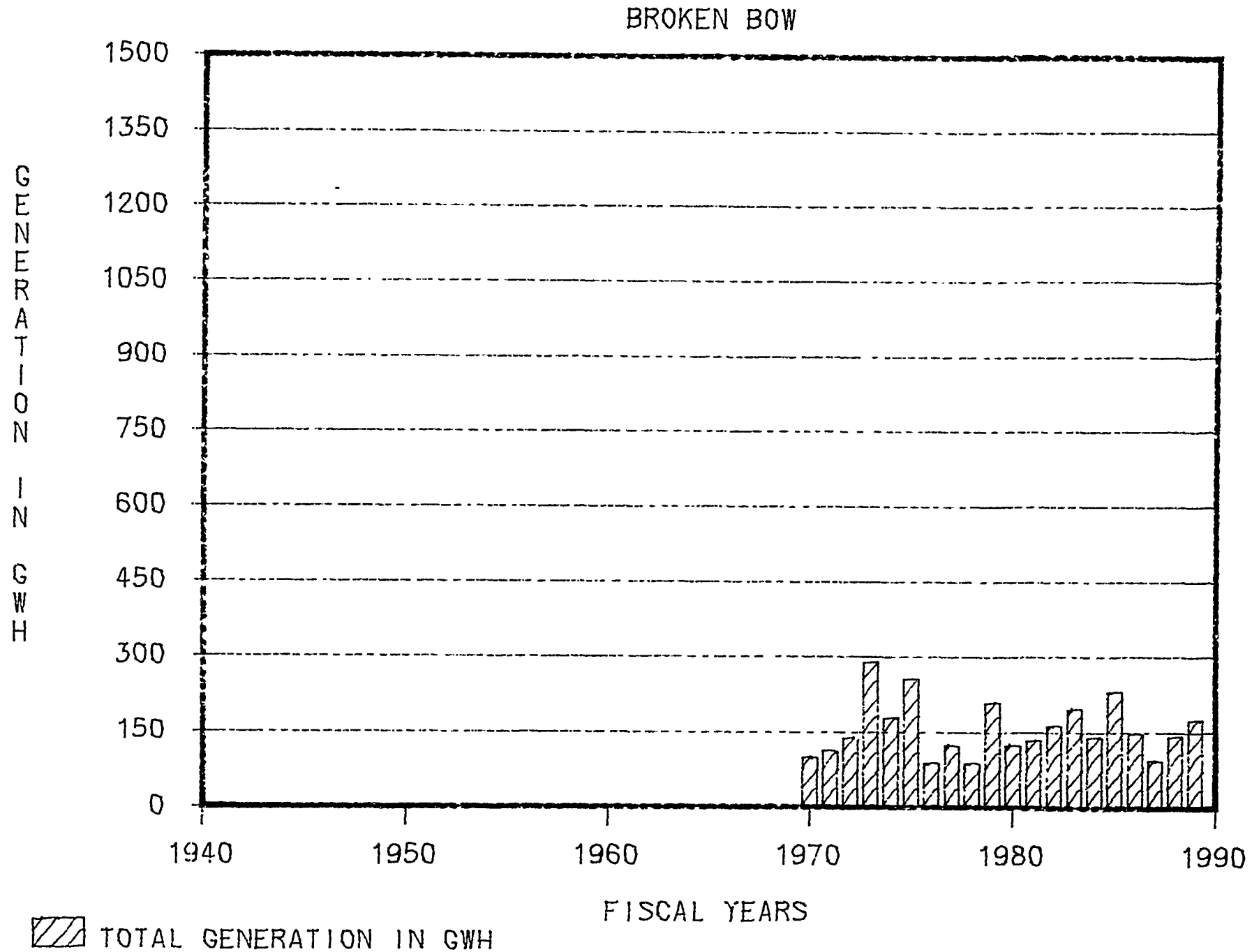
1990
FISCAL YEARS
TOTAL GENERATION IN GWH


BROKEN BOW
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1200
1050
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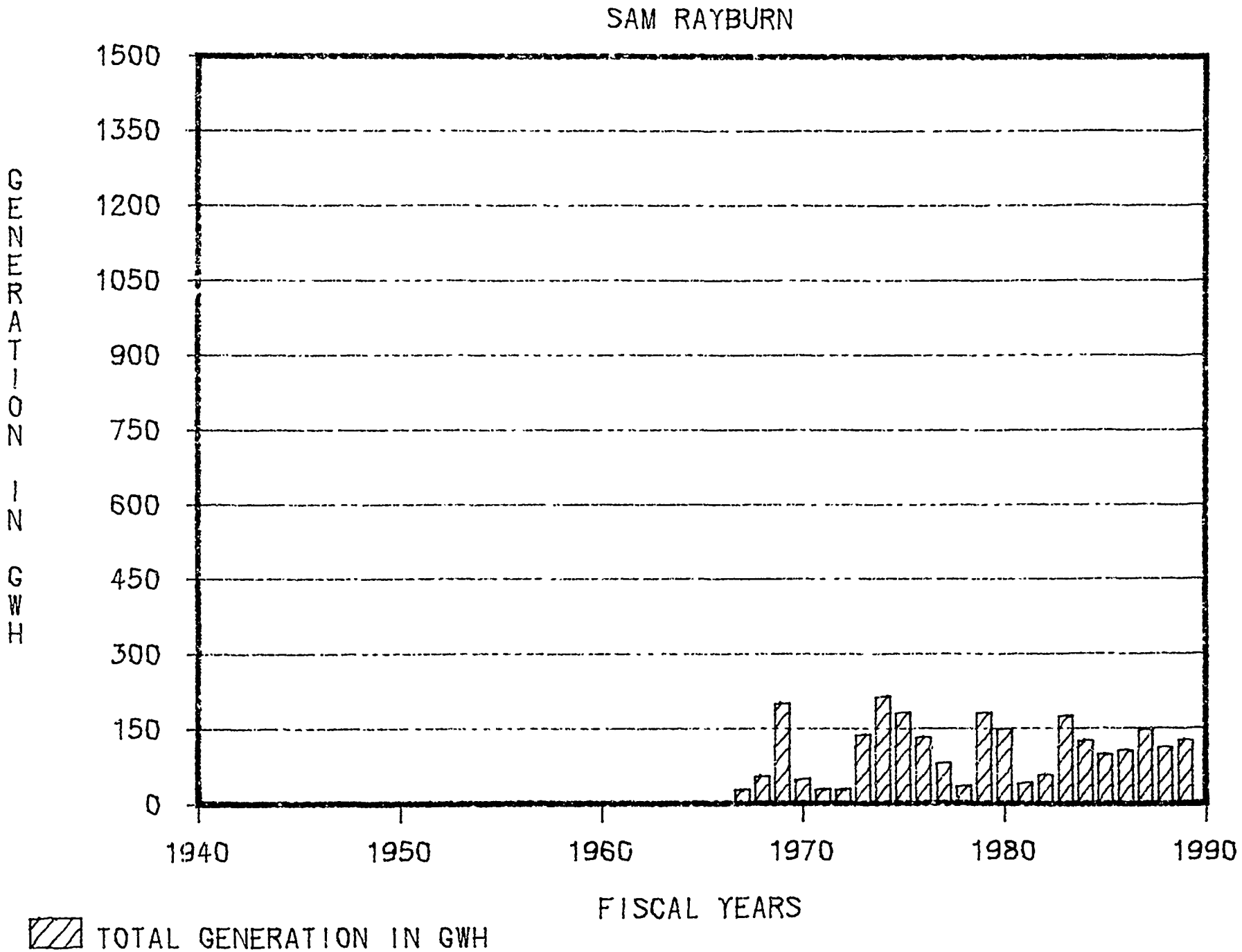
1990
FISCAL YEARS
TOTAL GENERATION IN GWH


SAM RAYBURN
1500
1350
1200
1050
900
750
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GENERATION IN GWH
1940
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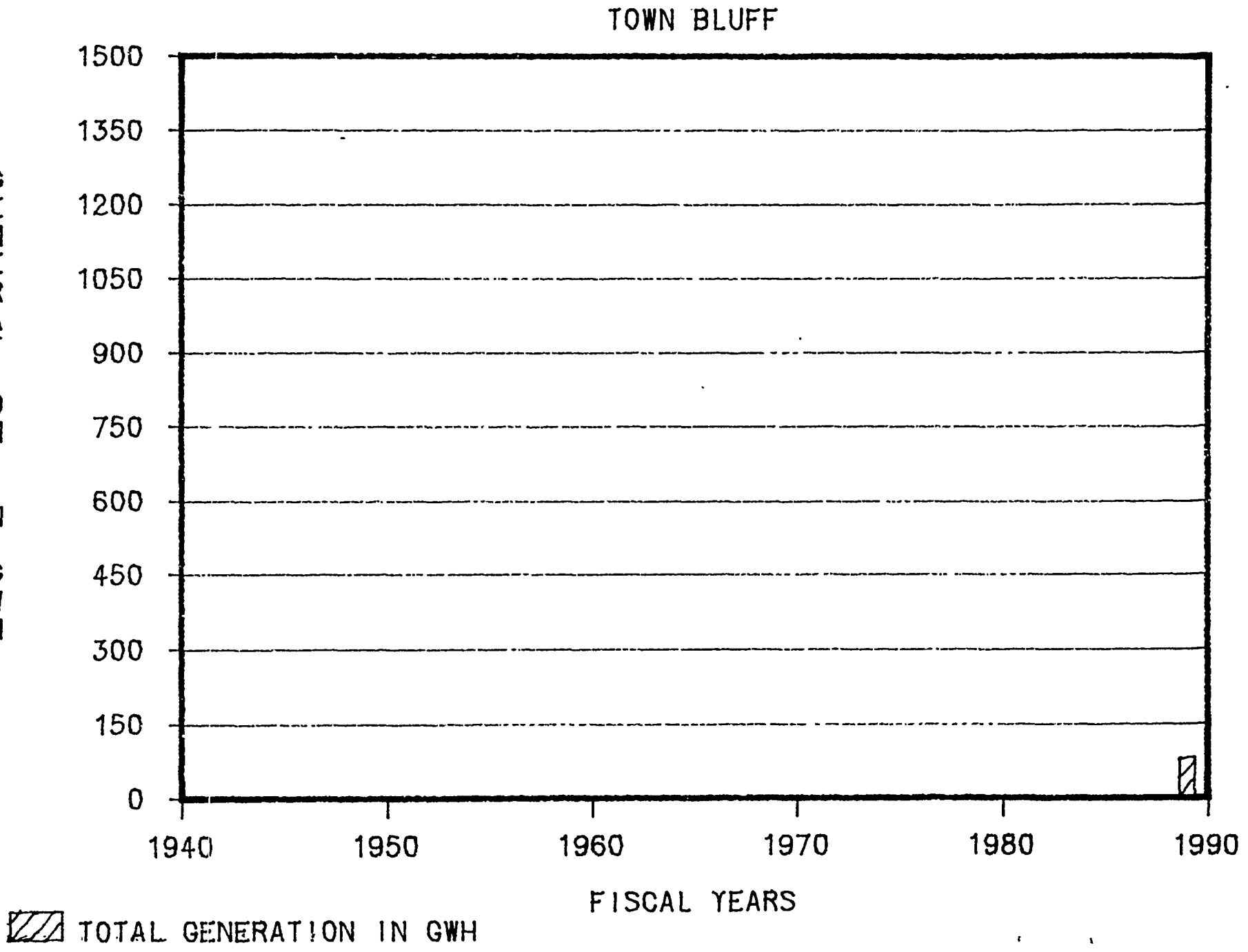
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 16


TOWN BLUFF
1500
1350
1200
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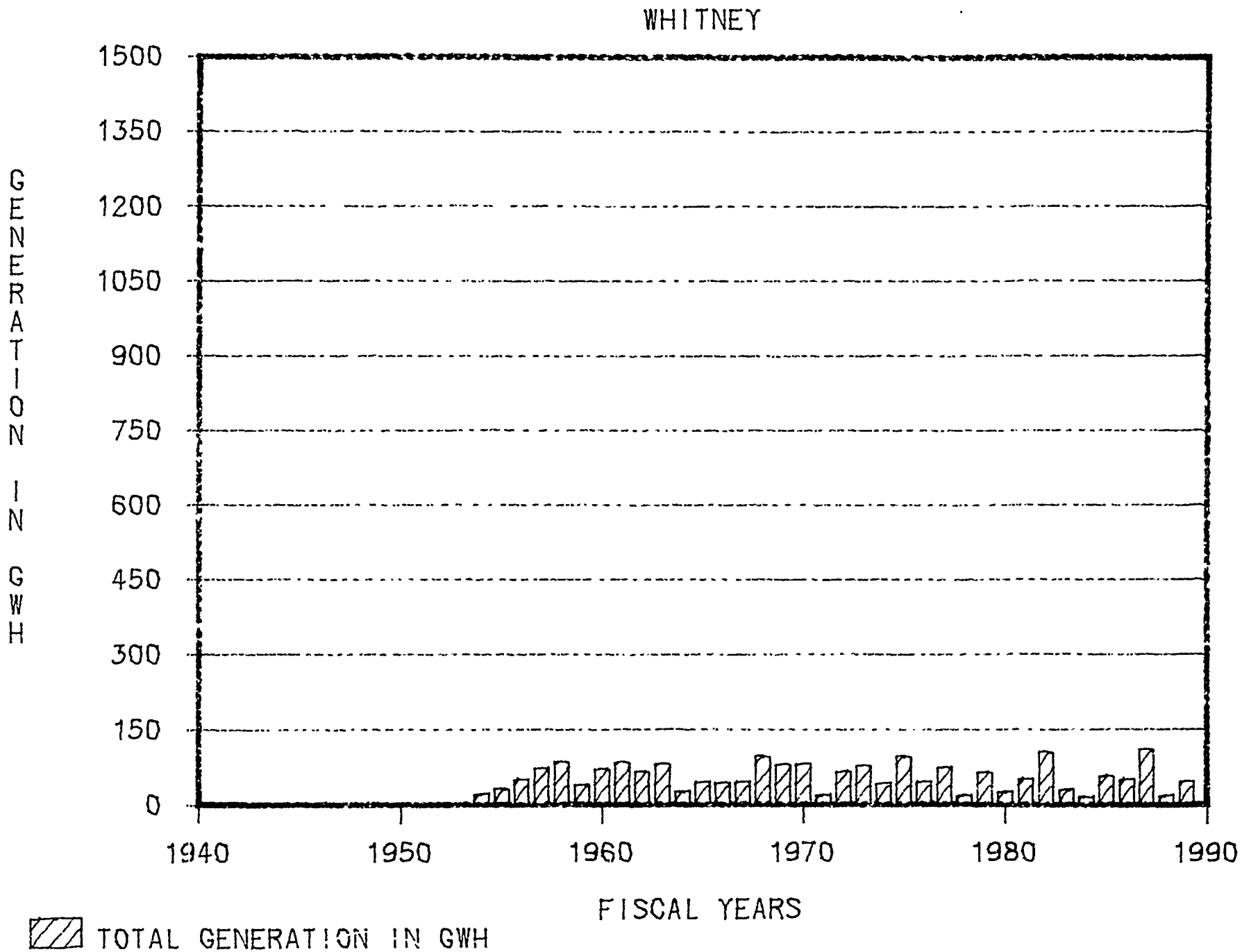
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE V - 17


WHITNEY
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GENERATION IN GWH
1940
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1990
FISCAL YEARS
TOTAL GENERATION IN GWH

# SECTION VI - DISTRICT WATER CONTROL ACTIVITIES

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### 1. PROJECT VISITATION BY WATER MANAGEMENT PERSONNEL

a. ALBUQUERQUE DISTRICT. During FY 89, Abiquiu, Brantley,Cochiti,Galisteo, John Martin, Jemez Canyon, Navajo, Platoro, Pueblo, and Santa Rosa projects were visited by Reservoir Control Section personnel.

b. FORT WORTH DISTRICT. Seven of the twenty-four district reservoir projects were visited by Water Management personnel during Fiscal Year 1989. Joe Pool Lake was visited in March 1989, Canyon Lake was visited in April 1989, Benbrook Lake and Grapevine Lake were visited in June 1989, B.A. Steinhagen and Sam Rayburn Lakes were visited in July 1989, and Whitney Lake was visited in August 1989. Water Control Manuals, flood control and emergency operation procedures, gate operations and calibration, potential areas of flooding, shoreline and downstream erosion, impacts of project operations, and the Water Control Data System data collection and dissemination were discussed with project personnel during these visits. In addition the impacts of non-federal hydropower operation were discussed with the Canyon Dam personnel.

c. GALVESTON DISTRICT. On 10 May 1989, Hydrology and Hydraulics personnel visited the Addicks Project Office to discuss operational procedures and make a sediment deposition inspection. Several trips were made to the Project Office during the year to interrogate the Alert Base Station.

d. LITTLE ROCK DISTRICT. The Section Chief and Little River regulator visited DeQueen Lake to observe maintenance construction to the stilling basin which included construction of a coffer dam, dewatering of the stilling basin and concrete patching of eroded holes in the floor of the stilling basin. The Gillham project was also visited on this trip to meet resident personnel. Gate tower vibrations associated with high releases at a pool elevation of 532 were observed. Also observed was the tailrace and the tailwater gage at a release rate of 2,900 cfs.

The Blue Mountain regulator and streamgaging personnel visited the Blue Mountain project to observe annual maintenance work to the service gates. The tailwater gage was also observed and checked. On this trip the Nimrod project was also visited to meet with resident personnel. The gate house and galley were toured where resident personnel explained the mechanical operation of the gates and apparatuses.

The District Engineer and Section Chief met with approximately 50 locals (mostly farmers) from the Augusta-Georgetown area at a gathering near Russell, Arkansas to explain the White River projects operations and to answer questions.

The District Engineer and Section Chief visited the Mountain Home area to meet with dock owners and SWPA representatives on general project operations and hydropower releases and schedules.

The Section Chief visited Bull Shoals and Norfork projects in conjunction with a presentation on lake operations to Gainsville, Missouri Chamber of Commerce.

e. TULSA DISTRICT. Twenty-three project sites were visited by Reservoir Control Section personnel this year. The projects visited and the purpose for the visits are listed in the following table.

PROJECT VISITATION - FY 89

| PROJECT | PURPOSE OF VISIT |
|---|---|
| Arcadia | Channel capacity determination |
| Birch | Site familiarization |
| Broken Bow | Inspect spillway release for trout fishery |
| Canton | Site familiarization |
| Chouteau | Lock inspection |
| Council Grove | Scheduled Reservoir Control visit |
| Fort Gibson | Site familiarization |
| Fort Supply | Scheduled Reservoir Control visit |
| Heyburn | Stilling basin inspection |
| John Redmond | Scheduled Reservoir Control visit |
| Kaw | Site familiarization |
| Keystone | " " " " |
| Lake Hudson | Scheduled Reservoir Control visit |
| Marion | " " " " |
| McGee Creek | " " " " |
| Newt Graham | Lock inspection |
| Optima | Scheduled Reservoir Control visit |
| Pensacola | " " " " |
| Robert S. Kerr | Site familiarization |
| Skiatook | " " |
| Tenkiller | " " |
| Texoma | Scheduled Reservoir Control visit |
| Webbers Falls | Site familiarization |

2. SPECIAL RESERVOIR OPERATIONS.

a. ALBUQUERQUE DISTRICT. The watersheds within Albuquerque District (AD) received well below normal snowmelt runoff for the second year in a row. No major rainfall events occurred in 1989. Construction of the non-Federal Abiquiu Dam Hydropower Project continued in 1989. The conduit was closed from 15 November 1988 to 10 March 1989 to permit the construction of the plenum chamber and associated works. During this period, a flow of approximately 50 cfs was pumped over the dam to meet downstream fish and wildlife needs. The project is 95 percent complete and is expected to be on line by mid 1990. The completion of the project is being delayed due to a levelness problem with the generators.

Abiquiu Reservoir had two other deviations in 1989 that reduced releases to facilitate the maintenance of diversion structures below the dam. There was also one deviation on the Rio Grande in which Cochiti Lake and Jemez Canyon Reservoir coordinated to reduce the combined release to assist in the installation of channel protective works.

Brantley Reservoir, a new Bureau of Reclamation project on the Pecos River above Carlsbad, New Mexico, is now fully operational. The reservoir filling plan was completed during 1989. The project purposes include irrigation, flood control, fish and wildlife enhancement, and recreation. The old McMillan Dam, which is located within the reservoir area of Brantley, is scheduled to be breached in the fall of 1990.

The Reevaluation of the Rio Grande Operating Plan study was completed in July 1989. This 2-year multi-agency study analyzed the operation of Federal reservoirs in the Upper Rio Grande Basin. As a direct result of the study, various opportunities were identified to enhance flood control and improve the beneficial use of the water resources in the Rio Grande Basin above Fort Quitman, Texas. Also, specific projects have been identified for future study.

In FY 89, the AD continued to work on development of Drought Contingency Plans (DCP) for the Arkansas, Canadian, Pecos River, and Rio Grande Basins. The Arkansas River Basin DCP was completed and submitted to Southwestern Division (SWD) for final approval. The Canadian River Basin DCP was disseminated for interagency review and is being revised to address interagency comments. It is scheduled for final submittal to SWD in November 1989. The Pecos River Basin DCP was sent out for interagency review in September 1989 and is scheduled for final submittal to SWD in December 1989. The Rio Grande Basin DCP is being developed and is scheduled for first draft submittal to SWD in December 1989.

During FY 89 the Arkansas River Basin was in a moderate to severe drought with John Martin Reservoir and Trinidad Lake each reaching Level 3 severity. Trinidad Lake and John Martin Reservoir were lowered considerably as a result of the irrigation demand caused by the dry conditions. No requests for assistance or coordination were received by the AD.

b. FORT WORTH DISTRICT.

(1) General. Due to the drought conditions in effect at the beginning of Fiscal Year 1989, most district lake projectswere storing water at very low to moderately low levels. With the exception of Canyon Lake, which was slightly in the flood pool, the percent conservation pool occupied varied from about 17% to 92%. Stillhouse Hollow Lake established a new record low elevation in December 1988. Benbrook and Sam Rayburn Lakes set new record low elevations in January 1989. Heavy rains during March-June forced nineteen flood-control projects, out of twenty four, to utilize the flood pool storage at least once. Lake levels at Benbrook Lake exceeded the notch crest, exceeded the uncontrolled spillway crests at Grapevine and Lewisville Lakes and Lavon Lake evacuated surcharged water above the normal top of gates. Benbrook and Lavon Lakes set new record high elevations in June 1989. There were eleven requests from the Fort Worth District to the Southwestern Division for deviations from the approved project Plans of Regulation.

(2) Flood Operations.

(a) General.

A wet month of May 1989 produced well above normal rainfall run-off conditions in most of North Texas. The Dallas/Fort Worth rainfall for May was 9.62 inches (5.35 inches above normal), Waco was 4.34 inches (2.3 inches above normal), Wichita Falls was 4.54 inches (0.20 inches above normal), and Abilene was 3.07 inches (0.18 inches below normal). The rainfall, through June 1, 1989, for Dallas/Fort Worth was 21.46 inches or 7.56 inches above normal. On the 3rd and 4th of May rainfall amounts of 1 to 3 inches fell over most of North Texas, however, no flooding resulted from this rain. The 24 hour total, at the Dallas/Fort Worth Airport, of 5.34 inches was recorded on-May 16 to May 17. During the early morning of May 16, Antelope, Texas received 11.18 inches officially and Bowie received 10.25 inches. The following night, unofficially, Mansfield and Rendon south of Fort Worth received 13 inches of rainfall while officially, Lillian received 9.30 inches of rainfall. The concentration of rainfall of 6 to 10 inches extended from near Glen Rose to South Dallas and to Lake Lavon, east of Dallas. Much of the remainder of North Texas received 4 to 6 inches while the area from southwest of Cleburne to Terrell to south of Bonham to Fort

Worth and back to the southwest of Cleburne recorded greater than 6 inches. Late May also produced some light rains, however, these rains were insignificant.

The result of these heavy rains produced major flooding in North Texas. The West Fork of the Trinity experienced a significant rise from Bridgeport to Eagle Mountain-Lake and to Lake Worth. Uncontrolled flows at Lake Benbrook went over the notch crest for the second time ever, as the first time occurred in May 1957. This was quite significant, since in January 1989 Lake Benbrook set an all time low elevation dating to impoundment in the early 1950's. Lake Arlington, on Village Creek spilled over the emergency spillway for the first time, thereby, producing major flooding downstream to the confluence with the Trinity River. The newly constructed Joe Pool Lake located south of Dallas, filled to 3 feet above conservation pool. The Trinity River at Dallas crested at its 5th highest stage since the beginning of record keeping dating to the late 1800's. It crested at 42.97 feet (flood stage is 30 feet), the highest crest recorded since the construction of Benbrook, Lewisville, and Grapevine Lakes. Rosser crested at 36.15 feet (flood stage is 26 feet), Trinidad crested at 42.72 feet (flood stage is 28 feet), and Long Lake crested at 45.5 feet (flood stage is 35 feet). Major flooding resulted in South Dallas where many families had to be relocated and major flood damages were experienced. A few drownings were recorded, most being the results of people driving around barricades. Flooding along the rural areas forced many ranchers to evacuate large numbers of livestock out of the flood plain.

All lakes in North Texas were full or nearly full,therefore, a potentially critical situation existed because the capacities to store additional flood waters were essentially eliminated.

The wet month of May continued into June producing major flooding throughout the Dallas/Fort Worth area. From June 1 through June 14, rainfall was continuously recorded somewhere in North and East Texas. The Dallas/Fort Worth Airport recorded 8.75 inches of rainfall or 6.16 inches above normal for the month of June, 89. Halfway through the year, Dallas/Fort Worth had exceeded its normal yearly rainfall with 30.21 inches being recorded in comparison to the normal yearly average of 29.46 inches. Abilene and Wichita Falls registered their secondwettest June on record, 9.53 inches (7.01 inches above normal), and 8.60 inches (5.57 inches above normal), respectively.

(b) Red River Basin.

During the May 16-18 storm events, Lake O' the Pines utilized 26 percent of its flood pool and Wright Patman utilized 18 percent of its flood pool. Releases from Lake O' the Pines were curtailed for several days as downstream areas experienced minor flooding. At Wright Patman the release rates were also curtailed until downstream channel capacities became available. Flows into Wright Patman peaked at 30,000 and 40,000 cfs during May and June run-off events. Flows into Lake O' the Pines peaked at about 25,000 cfs in May at approximately 15,000 cfs in June.

(c) Neches River Basin.

Below normal rainfall in the Neches River Basin during calendar year 1988, attributed to a record low elevation of 151.07-ft NGVD for Sam Rayburn as recorded on January 10, 1989. Rainfall during the early spring months saturated the watershed and slowly raised the lake level to near normal levels by the first of May. Runoff from the heavy rains of May 16-18 flooded several tributaries upstream of Sam Rayburn Reservoir, thereby raising the pool level to 33 percent of its flood control pool. Flows on the uncontrolled Neches River during May peaked at about 20,000 cfs near Rockland.

The mid and late June rains in the watershed caused a major rise in the Sam Rayburn lake level as it peaked at 171.16 feet NGVD or 77 percent of flood pool in mid July. During this time, evacuation of flood waters was curtailed due to major downstream flooding. The Neches River at Rockland peaked at approximately 43,000 cfs in early July. The peak discharge from Town Bluff Dam of 43,750 cfs occurred on July 2-4. Along the Angelina River downstream of Sam Rayburn Dam, six low water crossings were inundated, restricting access to 20 homes, and several homes in lowlying areas sustained damage. The Lake Barlow Estates area, directly downstream of Town Bluff Dam, was evacuated and a number of homes sustained damage.

Heavy rainfall in the lower basin during this same period caused severe flooding on Village Creek and Pine Island Bayou. These flows totaled in excess of 80,000 cfs in the Beaumont, Texas area. Low lying areas were flooded, numerous roads were underwater, and a number of homes were flooded.

(d) Trinity River Basin.

The mini-drought of 1988 in the upper Trinity River Basin lowered the Corps of Engineers lakes to as much as 60 percent of conservation pool by the end of January 1989. The May 3-5, 1989 storm on the upper basin procured 4 inches of rain with

excess amounts of up to 5.5 inches in the mid-cities area. This rainfall saturated the watershed and its runoff resulted in raising lake levels into the flood pool. The May 16-18 rainfall was more significant in that the upper watershed received an excess of 6 inches with reports of up to 13 inches in the Burleson area. This event caused major flooding throughout the area, including Village Creek, the East Fork Trinity, and the Dallas area. The June 1-14 period again caused significant flooding, primarily to the mid-cities and Dallas area.

The following is a synopsis of the flood control operations at the Corps lakes in the upper basin. During this period the Reservoir Control Section responded continuously from June 4-18 and at other times as the situation required.

BENBROOK LAKE - Benbrook Lake, located on the Clear Fork of the Trinity River, was at a record low level of 685.68 feet n.g.v.d. From May 3-5 the lake received 5.05 inches of rain and the gates were closed to control downstream flooding. The lake level increased to 700.03 on May 9. At this time the gates were opened to release 1870 cfs and evacuation of floodwaters began. On May 14 a deviation from the approved Plan of Regulation was approved by the Southwestern Division office to close the gates to facilitate the search for a drowning victim. Because of another 4.63 inches of rain from May 16-18 and the corresponding high flows on the uncontrolled portion of the West Fork of the Trinity, the Benbrook Lake gates remained closed until May 30, 1989.

On May 24 the lake level peaked at 710.85 feet NGVD. This was only the second time that water had flowed through the notch since impoundment. The evacuation of floodwaters was curtailed again on June 3 as additional rainfall and high flows on the West Fork necessitated closure of the gates. The lake again filled and the lake level peaked on June 15 at 716.60 for a record high. The flow through the notch peaked at 5375 cfs. On June 26 the evacuation of flood waters was again initiated and progressively increased to 2976 cfs on June 28,1989.

JOE POOL LAKE - Joe Pool Lake is located on-Mountain Creek. Rainfall at Joe Pool Lake for May 3-5 totaled 5.03 inches. Due to local runoff that caused Mountain Creek Lake to spill, the gates at Joe Pool Lake were closed on May 4. An additional 7.67 inches of rain from May 16 -18 caused the Joe Pool lake level to reach 522.00 (top of conservation pool) for the first time on May 17, 1989. Due to downstream flooding, evacuation of flood waters were not initiated until May 29. The lake continued to rise to elevation 525.88, and from May 29 release rates were progressively increased to 800 cfs until June 2. An increase in downstream flows, due to continual rainfall in June, caused the gates to be closed again on June 3. The lake level

slowly increased and peaked at a record elevation of 528.97 feet NGVD on June 26. On June 26 releases were re-initiated and increased to 1550 cfs as the downstream conditions allowed. It is significant to note that Joe Pool Lake was in the process of filling before the floods started and from March to June receivedmore than 14 inches of runoff from its watershed. This amount approximated the previous record annual maximum runoff for the watershed.

RAY ROBERTS LAKE - Ray Roberts Lake is located on the Elm Fork of the Trinity River. Since Ray Roberts is a new lake and had just started to fill, the flood events did not fill the conservation storage. However, by the end of the flooding period, the lake had reached 85 percent of conservation pool and had stored approximately 676,000 acre-feet of water that would have otherwise over spilled at Lewisville Lake and added to downstream flooding.

LEWISVILLE LAKE - Conservation pool was raised from 515.00 feet NGVD to 522.00 feet NGVD on november 30, 1988. The new 522.00 elevation was reached on May 19, 1989. The project received 1.90 inches and 4.61 inches of rain during the May 3-5 and May 16-18 storms, respectively. The gates remained closed because of downstream flooding. On May 19, an elevation of 522.00 was reached and with the additional rains in June the spillway crest elevation of 532.00 was reached on June 15. The pool level peaked on June 22 at elevation 532.31 with an uncontrolled flow over the spillway of 270 cfs. On June 23 downstream conditions allowed for the initiation of flood releases which were progressively increased to 5300 cfs on July 1, 1989.

GRAPEVINE LAKE - Grapevine Lake is located on-Denton Creek. The project received 3.90 and 7.74 inches of rain-during the May 3-5 and May 16-18 storms, respectively. On May 17 the gates were closed so as not to add to downstream flooding on the Elm Fork and on the mainstem of the Trinity River. Evacuation of stored flood waters was initiated on May 24 at a rate of 250 cfs. This rate was progressively increased to 1780 cfs on June 2 but due to additional rainfall the gates were closed on June 4, 1989. The lake elevation continued to rise and on June 13 it exceeded the spillway crest elevation of 560.00 ft. NGVD. On June 15 the lake level peaked at 562.35 with an uncontrolled flow of 4525 cfs over the spillway. Downstream conditions finally allowed for the opening of the gates on June 23, 1989.

LAVON LAKE - Lavon Lake is located on the East Fork Trinity River just upstream of Ray Hubbard Lake. The East Fork flows into the mainstem of the Trinity, downstream of Dallas, Texas. Lavon Lake received 1.80 and 6.34 inches of rain during the May 3-5 and May 16-18 storms, respectively. The gates at Lavon were closed on May 5 due to downstream flooding and not reopened until May 28, 1989. With the heavy rainfall on May 16-

18, Lake Ray Hubbard released 40,000 cfs on May 17. These high flows contributed to the breaching of Kaufman Levee Number 6, Kaufman Levee Number 8, and Kaufman Levee Number 15. Since the channel capacity of the East Fork is only 2,000, cfs these high flows caused flooding of agricultural lands and homes at the lower end of the East Fork near the confluence with the Trinity River mainstem.

Additional rainfall in early June caused the pool level at Lavon Lake to continue to rise and on June 4, 1989 a 24-hour duty was initiated by the Reservoir Control Section personnel. In addition, regulatory personnel were sent to the project in case communications with the project were lost. At this time, the gates were closed and the pool continued to rise. On June 7, 1989 with a pool level of 502.95 (top of gates is 503.50) and a 2-hour inflow of 29,132 cfs, a release of 2,000 cfs was initiated in accordance with the Reservoir Regulation Schedule. Later that day releases were increased to 6,000 cfs and maintained until June 10, 1989 when reduced to 2,000 cfs. Because of additional rainfall in the watershed, surcharge operations were again initiated on June 13, 1989 when the release rate was progressively increased to 15,000 cfs. This release rate was reduced to 9,000 cfs on June 14, to 6,000 cfs on June 15, to 2,000 cfs on June 16, and to 0 cfs on June 19, 1989. It was not until June 26 that the downstream conditions allowed for evacuation of flood waters, at which time the release rate was progressively increased to 1,500 cfs.

(e) Brazos River Basin.

Because of below normal rainfall in the Brazos River Basin during calendar year 1988, the Corps lakes in the basin had been drawn down to between 70 and 90 percent of conservation pool by the end of January 1989. Rainfall during the early spring was sporadic but with the May 3-5 rainfall most of the basin was again recovering and in many cases saturated. The May 16-18 rainfall produced significant runoff and a sharp rise in the inflow to the lakes. The lakes in the upper basin experienced the greatest rise. As downstream channel capacity became available evacuation of flood waters was initiated in accordance with the plans of regulation for the various lakes. At the May peak, the flood control storage occupied ranged from 2 percent at Somerville Lake to 27 percent at Whitney Lake.

Before the flood waters could be totally evacuated, runoff from the June rains caused a second significant rise in the lakes in the Brazos River Basin. Only Stillhouse Hollow Lake did not utilize any flood control storage. This rise, though not as significant as the May runoff event, still utilized from 2 percent of flood control storage at Georgetown to 26 percent at Aquilla. The rainfall accumulation at the lakes in the Brazos basin during May and June totaled from 9 to 15 inches.

Due to the large channel capacity on the mainstem of the Brazos River, flood waters were evacuated without delay. Local flooding on the major tributaries were common but usually of short duration. On the Little River system minor agricultural damages were reported below some of the projects. Evacuation of flood waters at Proctor Lake exceeded the riverbanks, causing agricultural flooding. Other lowlying areas and sloughs experienced flooding for extended periods along the San-Gabriel and Leon Rivers.

(f) Colorado River Basin. Not applicable.

(g) Guadalupe River Basin. Not applicable.

(3) Non-federal Hydropower.

Canyon Lake hydropower facilities were completed in October 1989. Pressurization testing of the conduit and bypass system was completed in January 1989 and commercial power production began in January 1989.

License applications are currently under review for Lewisville, Ray Roberts, Wright Patman, and Lake O' the Pines. Lewisville is in an advanced stage, with the City of Dentine having contracted for design, specifications, and plans.

(4) Federal Hydropower.

Testing of the federal hydropower facilities at Town Bluff Dam began in April 1989 and is currently underway. Commercial power production began in May 1989 during this testing. This facility will be turned over to the Corps of Engineers for operation and maintenance in Fiscal Year 1990 after the testing is completed.

c. GALVESTON DISTRICT.

On 10 March 1989, the gates on Addicks and Barker Reservoirs were closed to store water for the Great Houston Rubber Ducky Race. Releases were made on 12 March 1989, the day of the race.

On 3 April 1989, the gates on Addicks and Barker Reservoirs were closed to store water for the 20th Annual Reeking Regatta held by the Buffalo Bayou Coalition on 8 April 1989. Releases were initiated on 7 April 1989, to provide the requested water levels for the event.

On 1 November 1989, the gates on Addicks Reservoir were closed for two hours to remove a stolen vehicle from the stilling basin.

d. LITTLE ROCK DISTRICT.

Rainfall over the LRD in FY 89 was approximately 4.7 inches above the yearly average. This above average rainfall was the result of several moderate rainfall events occurring in early spring and in the mid summer months. The most significant rainfall and inflows occurred in February where the average LRD rainfall was 3.06 inches above the monthly average.

Special operations and activities related to water control projects are summarized as follows:

(1) White River System

(a) As the water year began all of the projects in the White River basin were near or below their conservation pools. The first major event that occurred was in late November causing pool rises of two to ten feet. Norfork, Greers Ferry and Clearwater were the only projects to rise into their flood pools with Clearwater experiencing a ten foot rise. Rainfall from mid-February through March caused the largest rises of the year with Beaver and Table Rock cresting six feet and five feet, respectively, into their flood pools. Bull Shoals, Norfork and Greers Ferry crested ten to thirteen feet into their flood pools with Clearwater again experiencing the largest rise of twenty feet. All projects were evacuated through April and were at or near seasonal pools by May except for Greers Ferry. A deviation to enhance the fish spawn was in effect at this project. The last rise of the year occurred in mid-June and caused slight rises at the hydropower projects with a twelve foot rise at Clearwater.

(b) There were six deviations at the multipurpose projects in FY 89. Five were for hydropower involving the Southwestern Power Administration (SWPA). The other was requested by the Arkansas Game and Fish Commission (AG&FC) at Greers Ferry to alter the evacuation of the flood pool to minimize the impacts to the fish spawn. The deviation required the flood pool be evacuated gradually from elevation 463.5 to 463.0 from early May to the first of June and then to elevation 462.0 by the first of Jul.

(c) At Clearwater Lake there were three deviations including two which lowered the downstream regulating stage to minimize damage to downstream crops. The third deviation provided releases for a canoe race.

(2) Little River System

(a) Rainfall over the Little River basin in FY 89 ended at 14.1 inches above the yearly average. Rainfall in February of 2.9 inches above the monthly average produced the largest project inflows for FY 89 resulting in several rises with maximum rises of 3.5 feet at Millwood Lake and 22 feet for the tri-lakes. The 22 feet rise at Gillham Lake was the maximum utilization of flood control storage for the basin for FY 89 of 28 percent. Above average rainfall in May through July 1989 caused a maximum rise of 16 feet for the tri-lakes and a rise of 7.5 feet at Millwood Lake.

(b) There were three deviations at Millwood Lake in FY 89. One was a drawdown requested by the AG&FC to continue clearing of boat lanes. The drawdown was initiated in September 1989 and was completed on 1 November, 1989. A second deviation provided supplemental releases from the conservation pool over the Labor Day weekend to enhance fishing downstream of the lake. Another deviation in effect from mid May to June 1989 limited flood releases to 18,000 cfs to prevent flooding of downstream crops.

(c) An AG&FC fishery drawdown at Gillham Lake was initiated in October 1988 and was completed in February 1989.

(d) Releases were adjusted at Dierks Lake to provide releases for a canoe race.

(3) Arkansas River System.

(a) Flows on the Arkansas River were below average for October through January even though rainfall in November was above average. April flows were approximately half the average with rainfall on the Arkansas River Basin 2 to 3 inches below normal. In February and June above average local rainfall, in combination with rains experienced in Tulsa District (SWT), produced flows for the month that were approximately twice the average. September flows were three times above average largely as a result of precipitation experienced in the SWT. The total annual flow for the Arkansas River was less than average, however, navigation conditions during FY 89 were good to excellent most of the time. In December deviations were required due to shoaling in Pool 13 and high rock in Pool 7. Normal operational limits were re-established for Pool 7 in February after removal of the high rock. Pool 2 required deviations to remove shoals in February and April. Pool 7 was raised in April to maintain navigation depths until dredging removed problem shoals. In March and April deviations were issued to allow changes in the

taper. The taper deviations were coordinated efforts between Little Rock District and SWT, and approved by the Southwestern Division.

(b) At Blue Mountain Lake, the rainfall that occurred in late January, February and early March produced pool rises of 8 and 21 feet, with rises of 13 and 4 feet from rainfall in May and July, respectively. At Nimrod Lake, from November to July there were rises of from 1 to 13 feet with the largest being approximately 18.5 feet from the rainfall event in February 1989.

(c) There were two deviations at Blue Mountain and one at Nimrod in FY 89. The deviations at Blue Mountain both included the reduction of flood releases. One was to hold the pool level during a fishing tournament and the other to allow the relocation of the City of Danville's water line downstream of the dam. The deviation at Nimrod provided releases for the continuation of water quality studies being conducted by the Waterways Experiment Station.

(4) Studies, reports and investigations related to water control projects are summarized as follows:

(a) White River Lakes Regulation Study. Work continues on the analysis of alternative operating plans for the White River. The work is being conducted by the Reservoir Control Section using the White River Super Model. Work has centered around refining the operation of the model itself to ensure it adequately reflects the hydrology and potential characteristics of the system. In conjunction with the study a new White River Master Manual is being written. This manual will document the detail of the new operating plan and will be the basis for system regulation in the future. The manual is scheduled for completion by September 1990.

(b) Table Rock Dissolved Oxygen Study. Studies by the Waterways Experiment Station (WES) recommend the use of in-lake hypolimnetic oxygen (hyp-ox) injection to meet the target water quality standards for the Table Rock hydropower releases. WES is currently doing the preconstruction studies needed to design, locate, and size a hyp-ox system for Table Rock. The current schedule is for submission of a report in late FY 90. Funding used in FY 89 was $70,000. Funding scheduled for FY 90 is $100,000.

(c) Development of Norfork Unit Number 3 - The City of Conway, Arkansas, has been tentatively selected as the sponsor for Federal construction of an additional unit at Norfork Dam. When approved, the Conway Corporation will provide financing for the design, construction and operation and maintenance of

the project in exchange for a power allocation from SWPA. The Corps will be responsible for approving and performing the design, construction and operation of the project.

(d) The Arkansas River Basin Study is a general investigation study. The cost-sharing agreement with the States of Arkansas and Oklahoma and the Little Rock and Tulsa Districts was completed in July 1987. The study, which includes navigation and nonnavigation components, is investigating four principal study features. Improvements to the Arkansas River system operating plan are being investigated with the goal of optimizing flood control and navigation without adverse effects on other authorized purposes. In Arkansas, the usability of the Arkansas River as a water supply source and the feasibility of reconstructing existing Arkansas River levees are being investigated. The Oklahoma portion of the study is evaluating a new multi-purpose project to provide needed flood control, water supply, navigation storage, and recreation. The site under investigation is located near Perkins on the Cimarron River. The feasibility report is scheduled for completion in September 1990.

(e) The Arkansas River Land Impact Study was initiated as a result of numerous complaints concerning the frequency and duration of flooding along the main stem of the Arkansas River. The study objective is to identify any lands where additional real estate acquisitions are required. The results of these investigations are being reported in a summary letter report and also in a Real Estate Design Memorandum Supplement for each pool where additional real estate actions are required. Study results indicate that additional flowage easements will be required on all pools except Dardanelle and Ozark. For pools not requiring real estate action data supporting this finding will be forwarded for review in the form of a Hydrologic and Hydraulic Report. The study began in March 1986. The letter report was completed in September 1989 and is in SWD for review. The Real Estate Design Memorandum Supplements are tentatively scheduled to be completed in 1991.

(f) The Beaver Lake Water Quality Study (General Investigations Survey) was a one-year comprehensive study whose purpose was to identify measures to preserve and enhance the quality of the reservoir's water. The quality of the water in the lake is polluted from both point and non-point sources. Efforts have already been implemented to reduce the amount of pollution entering the lake from point sources. The majority of the pollution is from non-point sources. This study recommends the best land use management plan for non-point source pollution. The Beaver Lake Water Quality Study was completed in September 1989.

(g) White River and Tributaries, Arkansas is a general investigation study of the impacts of Little Rock District reservoir operations on navigation in, and recreation activities on, the White River and its tributaries in Arkansas during low-water periods. It has been requested that water releases from the White River reservoirs be modified to augment flows for navigation and recreation. Many times in the summer and fall navigation on the White River is delayed. This increases shipping costs for agriculture and other commerce in the region. Recreational interests are concerned with the effects that low flows have on the trout fishery and the other recreational uses of the river. A reconnaissance report was completed in September 1989. Negotiations for the cost shared feasibility study are under way.

(h) Montgomery Point Lock and Dam. Low water levels in the Mississippi River at the mouth of the White River cause delays in navigation and increase dredging costs in the White River Entrance Channel of the McClellan-Kerr Arkansas River Navigation System. Results received from the Waterways Experiment Station indicate that the only feasible solution is a new lock and dam. Additional testing has confirmed that the most economical location is in the White River Entrance Channel at approximately mile 0.5. The present schedule calls for submission of a Feasibility Report in September 1990 with a public review of the draft report occurring in July.

(i) Wilbur D. Mills Dam (LD#2) Stilling Basin Enlargement. This dam has a history of erosion of the riprap scour protection downstream from the stilling basin, requiring numerous intermittent repairs. Since the dam is constructed on piling, extensive scour could cause the structure to fail. Physical model studies of several possible permanent solutions to the scour protection problem were done at the Waterways Experiment Station. A plan which involves sinking barges filled with grouted riprap downstream from the stilling basin end sill was selected as being the most cost effective while still providing the required protection. An FY 1990 construction start is planned contingent on approval and funding.

(j) Non-Federal Hydropower Development. In FY 89 all hydropower units at James W. Trimble Lock and Dam (No. 13) and at Murray Lock and Dam (No. 7) became operational. Hydropower at Lock and Dam No. 13 is generated with three 10-megawatt(mw) units and two 19.5-mw units at Lock and Dam No. 7. Licenses on the Arkansas River have also been issued at Arthur V. Ormond Lock and Dam (No. 9), Lock and Dam No. 3, Wilbur D. Mills Dam (No. 2) and at Nimrod Dam. Construction at the powerplant at No. 9 is expected to begin in 1990 for three units which can operate with river flows between 3,000 and 150,000 cfs and have a maximum power release of about 31,500 cfs. LRD continues to be

responsible for reviewing preliminary permits and applications filed with the Federal Energy Regulatory Commission (FERC) for development of non-federal hydropower at Corps projects or non-Corps projects within the limits of LRD to ascertain potential impacts on Corps responsibilities. The Corps also has the responsibility to review all designs, plans, and specifications for features which affect the integrity of the existing Federal structure or its operational adequacy.

(5). Construction related to water control projects are as follows:

(a) Beaver Dam Seepage Control. Supplement 1 to the Beaver Dam Safety Assurance Reconnaissance Report, completed in April of 1986, recommended that a cutoff wall be constructed through Dike 1. A contract to construct the cutoff wall was awarded in June 1989. Start of construction was delayed due to a protest, which was denied in September 1989. Notice to proceed (construction) was issued in October 1989 and a preconstruction conference will be held 14 November 1989. In January 1986 a deviation establishing the top of the flood control pool at elevation 1128.0 NGVD in lieu of 1130.0 NGVD, with the stipulation that water not be held above 1125.0 NGVD in excess of four days, is still in effect.

(b) Clearwater Spillway and Seepage Construction. A Reconnaissance Report (May 1986) recommended that seepage be corrected using material excavated from the spillway area, thereby enlarging the spillway at the same time. Also recommended was the addition of a parapet wall along the crest of the dam. The seepage correction and the parapet wall were approved, but not the enlargement of the spillway beyond the seepage excavation requirement. Construction commenced in November 1986 and was completed as of 25 September 1989 except for punch list items. These items should be corrected in November 1989.

(c) Table Rock Oxygen Injection System. Low dissolved oxygen content in turbine releases during natural thermal stratification of the lake will be elevated with liquid oxygen injected into the penstocks. This is a temporary system to avoid generation rate restrictions while a permanent system is designed and installed. This automated system was installed in FY 88 and experienced leakage problems prior to use. It has been reworked and was placed in test use status in November 1989.

(d) Arkansas/White River Containment Structure. A new channel is developing between the Arkansas and White Rivers. Should this new channel develop the sand laden flows from the Arkansas River could be carried to the White River. This sediment would have to be dredged from the White River at an estimated annual cost of approximately $3.1 million. The construction of an extension to the containment structure along the White

River Entrance Channel has been approved. A construction contract was awarded in June 1989 and construction is expected to be completed within two years.

(6) Other significant items relating to water management activities are as follows:

(a) Water Control Data System (WCDS). Reservoir Control personnel are utilizing applications software developed by LRD to enter all daily reservoir data, perform water budget computations, and prepare daily reports and forecasts. New morning reports were developed last year to include historical averages as a reference to current conditions. The DCP (Data Collection Platform) data are currently being retrieved from the National Environmental Satellite, Data and Information Service (NESDIS) downlink. historical data was also loaded into the DSS data base to provide a complete record of pertinent information for all projects and major streams. DCP data are being stored in the Data Storage System (DSS), a data base developed by the Hydrologic Engineering Center (HEC). Modifications continue to be made to the system to more fully utilize DCP data and, thereby, minimize the project reporting requirements for daily reservoir data. Additional software was developed to use DCP data directly from DSS in generating daily reports. Applications programs from HEC and modifications of those programs allow users to view, edit, and plot the data and to generate reports. Software has also been installed to graphically display rainfall data using programs developed by the Tulsa District. Additional software which was developed last year included new programs to determine project stage reduction benefits on a real time basis for projects in the White and Arkansas River basins.

(b) Data Collection Platform (DCP) Status. During FY 89, changes were made to receive data from the NOAA/NESDIS Automatic Processing System (DAPS) instead of the old Data Collection System (DCS) which was phased out. The Little Rock District (LRD) currently has a total of 97 DCP stations with 40 located in the Arkansas River basin, 13 in the Little River basin and 44 in the White River basin. Of these, 20 are maintained by LRD. We also use 23 stations outside the LRD area in conjunction with our real-time activities.

(c) Automation of Field Operations and Services (AFOS). LRD is currently receiving AFOS system data from the National Weather Service (NWS) Tulsa River Forecast Center through a line that also provides data to the Tulsa District and SWD. Selected products are routed to the TOTAL data base, DSS data base, and to a printer, while others can be viewed with the VUENWS program. Current software has been added to allow utilization of AFOS graphics products as well.

e. TULSA DISTRICT.

(1) ARKANSAS RIVER BASIN.

(a) General. Flows in the Arkansas Basin were near normal this year with the flood stage at Van Buren exceeded on only two days. Six different TAPER operations were run during the year. Seven deviations for the Arkansas River Basin in the Tulsa District were approved, with six of those dealing with either pool elevation changes or modifications to the system operating plan to aid navigation.

(b) Keystone Lake.

(1) Operation for Striped Bass in Lake. The operation of the spillway gates at Keystone Lake included the use of sluice gates whenever possible to draw water from the lower lake levels. This was done to aid the Oklahoma Department of Wildlife Conservation (ODWC) in their study entitled "Analysis of the Suitability of Keystone Reservoir, Oklahoma, for Habitation by Adult Striped Bass." Preliminary indications as reported by the ODWC are that "the modified release patterns have improved conditions in the reservoir for adult striped bass, but enhanced precipitation and colder air temperatures are probably also partly responsible." A review of the inflow volumes into Keystone Lake from January to October of 1989 shows that the flow volume from the Arkansas River was 3.4 times that of the Cimarron River. Since the ODWC study identified the Cimarron River water to be lower in quality, this would also help to explain the improved conditions in the lake.

(2) Operation for Endangered Least Tern Below Dam. The Corps is currently engaged in the negotiation of a U.S. Fish and Wildlife Service Biological Opinion on the least tern in the Arkansas River channel.

(c). Kaw Lake. The non-Federal hydropower unit at Kaw Lake, operated by the Oklahoma Municipal Power Authority (OMPA), was declared commercial on September 26, 1989. The run-of-river project releases a daily volume of water as determined by the Tulsa District Reservoir Control personnel. OMPA has not contracted for any storage in the conservation pool. The plant is currently undergoing testing during working hours and running at the required capacity during the remaining time. The discharge capacity of the single 37 megawatt unit is 5500 cfs.

(2) RED RIVER BASIN.

Flows in the Red River Basin during FY 1989 averaged about 140 percent of normal. Precipitation averaged about 130 percent of normal. Rainfall was much above average throughout most of the basin during May through July 1989. One

significant flood event occurred during FY 1989. This flood occurred during early June 1989. The heaviest rainfall was upstream of Lake Texoma. Runoff from this event caused Lake Texoma to rise to the fourth highest pool elevation since impoundment (about 58 percent of the total flood control storage was utilized).

Inflows were above normal at all of the Upper Red River Basin projects with the exception of Arbuckle Lake which had slightly below normal inflow. Intermittent above normal rainfall during the month of June resulted in a record pool at Foss Lake, second highest pool of record at Fort Cobb and third highest at Waurika Lake. These record pool elevations, however, did not result from an individual rainfall event of great significance, but from incremental rainfall events over a period of time with no opportunity to release stored floodwater.

Conduit releases of 50 cubic feet per second (cfs) were made at Denison Dam-Lake Texoma from 4 August through 18 September to alleviate a low dissolved oxygen problem in the stilling basin. A release of 140 cfs was made through the spillway sluice gate at Broken Bow beginning on 23 June 1989 to provide cold water for a put and take trout fishery demonstration project below the dam.

The Lake Texoma Advisory Committee continued to be very active during FY 1989. They had meetings on 26 October and 15 November 1988 and on 9 March, 18 May and 18 July 1989 and presented the Corps with their first report of recommendations in September 1989. The Drought Contingency Plan (DCP) for the Upper Red River Basin was completed this FY and work was begun on a DCP for the lower Red River Basin which should be completed in FY 90.

3. WATER QUALITY PROGRAM AND ACTIVITIES.

a. ALBUQUERQUE DISTRICT. The goals of the SWA water quality data collection program are to provide an accurate picture of lake conditions as to pH, turbidity, temperature, conductivity and dissolved oxygen. Trends are monitored to show improvement or degradation of water quality and the data collected is used to identify public health, fish and wildlife problems.

Readings are made on a monthly basis for the following parameters: surface pH, conductivity, secchi disk, dissolved oxygen, and temperature at the surface and at one-meter increments to the bottom.

This data is available in the SWA Operations Office. The following is a listing of sampling locations for each project:

WATER QUALITY SAMPLING LOCATIONS

| PROJECT | LOCATIONS | NUMBER |
|---|---|---|
| Abiquiu | Chama inflow, Canones inflow, reservoir near dam, release | 4 |
| Cochiti | Bland canyon, reservoir near dam, release | 3 |
| Conchas | Conchas and Canadian inflow, reservoir near dam, irrigation headworks | 4 |
| John Martin | Arkansas inflow, reservoir near boat ramp, reservoir near dam, reservoir near Ft. Lyon Hospital, two Lake Hasty locations, release | 7 |
| Trinidad | Purgatoire inflow, reservoir near dam, reservoir near Carpios Ridge | 3 |
| Jemez Canyon | Inflow, reservoir near dam | 2 |
| Santa Rosa | Pecos inflow, reservoir near dam, reservoir near asphalt pit, release | 4 |

Biological samples are tested monthly at all projects. District personnel are trained in the use of a gas chromatograph to test for dissolved nitrogen.

b. FORT WORTH DISTRICT.

(1) For FY 1989, water quality reports for Stillhouse Hollow and Somerville Lakes were completed and submitted to SWD for review and approval. Of the twenty four projects in the Fort Worth District, water quality reports for seventeen projects have been completed and submitted to date. Water quality reports for Waco, Whitney, Belton, Bardwell, Wright Patman and Lake O' the Pines are still pending approval by SWD. No major water quality problems of any significance have been found in any of these projects.

(2) Water quality surveillance at SWF for FY 1990 is $264,510 including an increase of 10% in the cost of sampling, compared to $248,590 for FY 1989.

c. GALVESTON DISTRICT.There were no Water Quality Activities during FY 1989.

d. LITTLE ROCK DISTRICT. The District water quality

management programs are divided between the Construction-Operations Division and Engineering Division by functional missions.

(1) Construction-Operations Division Responsibilities. The Permits Branch has responsibility for conducting the District water quality program for Construction-Operations Division. Since the regulatory functions of the branch under the Section 10/404 permit program closely parallel functions of the Division's water quality management program, field activities are very conveniently and efficiently combined to implement the programs. These responsibilities include the following programs relating to water quality management.

(a) Reservoir Monitoring. General reservoir water quality monitoring of all Little Rock District reservoirs other than the main stem of the Arkansas River is presently performed three times per year at six to eight stations per lake at various depths. Sample collection in the field and water quality analyses are done by USGS personnel under the Corps of Engineers Interagency Agreement. Approximately 26 parameters are measured to ascertain general reservoir water quality and to provide background data in detecting water pollution. There are no State or other Federal programs which routinely provide these data on the reservoirs operated by the Corps. Data obtained are maintained in the Permits Branch and are stored in and available from STORET, WATSTORE, and annual USGS Water Resources Data Publications for Arkansas and Missouri. Data obtained are used to evaluate basic water quality and long and short term water quality changes, to identify pollution sources, and to properly manage reservoir water quality. Their evaluations include the identification of potential pollution sources so as to enable the Corps to have meaningful input in the decision making processes of other agencies and groups with regulatory authority over basin discharges. These findings are published in Water Quality Management Reports and annual updates for each project. The Greers Ferry and Table Rock Water Quality Management Reports have been published and the Blue Mountain report is in progress. A statistical analysis has been performed on data collection thus far (1974-present) and has proved to be very valuable. Bottom sediment samples were collected from eight LRD reservoirs in 1984 and have been analyzed for organics, nutrients, and metals. This program is conducted pursuant to ER 1130-2-334.

(b) Discharge Permit and Operational Monitoring. Discharge permit and operational monitoring of 34 Corps-operated wastewater treatment systems in the District is performed in accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements. The USGS obtains the necessary monthly samples and analyzes these for Biochemical Oxygen Demand (BOD), bacteria, and suspended solids. Operational monitoring performed twice weekly by the sewage treatment plant operators

includes in some cases pH, flow, chlorine residual, dissolved oxygen, and settleability. Operational changes are recommended as necessary. Data are formatted and computer stored in Permits Branch. This program is conducted in accordance with Section 402 of the Clean Water Act which requires reporting to the Department of Natural Resources in Missouri and the Department of Pollution Control and Ecology in Arkansas.

(c) Bathing Beach Monitoring. Monitoring is performed five times monthly by resident area personnel on District bathing beaches during the swimming season to insure safe bacterial quality of reservoir waters. Samples are analyzed by the Missouri and Arkansas Health Departments free of charge. A central log containing results for all projects is maintained by the Permits and Water Quality Section. This program is administered in accordance with SWD Regulation 1130-2-9 and applicable State laws.

(d) Potable Water Monitoring. Potable water supplies of the District are tested for physical, chemical, and bacterial quality. Samples are collected by resident area personnel and mailed to the appropriate health departments, which perform the analyses free of charge. When tests indicate a bacterial problem, corrective measures are immediately taken. In some cases chronic problems detected by this sampling causes wells to be replaced or reworked. Permits Branch personnel collect samples for complete chemical analysis by the health departments on each new water supply and for periodic nitrate analysis thereafter. Data obtained are used in the periodic sanitary survey and report forwarded to SWD for reporting to OCE. This program is conducted in accordance with ER 1130-2-407 and applicable Federal and State drinking water standards for non-community water supply systems.

(e) Dredged Material Analysis. Periodically, a bottom sediment survey is performed at twelve locations along the Arkansas River navigation project and less frequently at other locations on other District rivers and reservoirs. Sediment and water column samples are frozen and sent to SWD laboratory for sediment, water, and elutriate analyses. The purpose of this program is to detect potential effects of dredging operations on water quality, and to have these data available for the required 404(b)(1) evaluations of future Corps and private dredging. These operations include both commercial dredging under Corps permits and channel maintenance dredging performed under Corps of Engineers contract.

(f) Pollution Complaints and Hazardous Substances. Permits Branch and Resident Offices receive calls reporting instances of pollution and hazardous substance spills. These reports are coordinated with the appropriate Federal and

State officials. On occasion, Corps personnel investigate these pollution complaints to verify existing conditions and determine effects on project operations. During oil and other hazardous substance spills, Corps personnel participate in notification and other emergency measures with Coast Guard and EPA officials and when so designated, act as the Federal on-scene coordinator for these two agencies under the National Contingency Plan. The LRD Oil and Hazardous Substances Pollution-Contingency and Spill Prevention, Containment and Countermeasure Plan was rewritten and updated as of August 1983.

(g) Special Activities. Permits Branch periodically assists Engineering Division and Planning Division in obtaining samples and analyses for special water quality and planning studies. Coordination is also accomplished on studies being performed by other agencies such as the EPA, Health Department, Soil Conservation Service, etc. Cooperative water quality studies are periodically conducted with other agencies in monitoring activities authorized under Corps Section 10 and 404 permits. Permits Branch personnel are also involved on a daily basis with personnel from the Arkansas Department of Pollution Control and Ecology in the processing of Corps permits and resolving the water quality matters arising therein.

(2) Laboratory Capabilities. Water quality analysis performed at the District level are limited to the following capabilities:

(a) Field testing of water quality which may be conducted by the Corps personnel includes dissolved oxygen, temperature, pH, specific conductivity, Secchi Disc measurements, and others using HACH field test kits approved by EPA.

(b) A small laboratory located in Construction-Operations Division can perform the following analyses: dissolved oxygen, color, turbidity, alkalinity, hardness, and others using colorimetric methods of analyses.

(3) Data Management. Reservoir water quality data collected and analyzed by USGS are entered into WATSTORE and STORET, the computerized data management systems of the USGS and EPA, respectively. These data are also published in the annual USGS water resources reports for Arkansas and Missouri. Results of potable water, bathing beaches, NPDES, and other monitoring are kept in computer storage, log books, or files as appropriate. Special data collection results are contained in the reports dealing with the specific subject for which data were collected.

(4) Engineering Division Responsibilities. There is no specific organization for water quality studies within the Engineering Division. Responsibility is assigned to the various

elements based on the nature of the program study.

(a) Reservoir Profile and Release Monitoring. Water quality data have been collected at Beaver, Table Rock, Bull Shoals, Norfork, and Greers Ferry Lakes since 1966; at Blue Mountain, Clearwater, and Nimrod Lakes since FY 81; and at DeQueen, Dierks, Gillham and Millwood Lakes since April 1981. The data collection at all projects, except at Table Rock was discontinued after FY 89. The data collected in the program consists monthly profiles of pH, temperature, dissolved oxygen, and specific conductance. The data is collected and published by the USGS and is available on the WATSTORE and STORET database. After this year profiles will be taken at Table Rock from July through December to specifically address the ongoing dissolved oxygen problem.

(b) Special Studies. The Hydraulics Branch in conjunction with the Planning Division, periodically conduct water quality studies as part of normal project planning efforts such as preparation of survey reports, design memorandums, and environmental impact statements.

e. TULSA DISTRICT.

(1) Lake Texoma Net Pen Aquaculture Demonstration. Environmental Analysis and Support Branch (EASB) continued to collect water quality data until June 1989 at Lake Texoma for determining the effects of net pen aquaculture of channel catfish on lake water quality. Activities included field measurements, laboratory analysis of water samples for a number of physicochemical parameters and completion of a computer model capable of predicting water quality based on varying conditions of facility design, hydrodynamics, morphometry and existing water quality. The data are being analyzed and a final report is scheduled for completion by the end of January 1990. The computer model is nearly complete and also should be available in January 1990.

(2) Arcadia Lake, OK. EASB completed field work on a water quality and sediment study of Arcadia Lake. This study was initiated in response to public concerns about water and sediment contamination with heavy metals and organochlorine pesticides. In addition, fish tissue samples are being analyzed to determine if any of these contaminants were bioconcentrated in tissue. Water samples were collected once in April and biweekly May through September. Sediment samples were taken from the lake bottom and major tributaries flowing into the lake and analyzed for organochlorinated pesticides, mercury, lead and manganese. Field collections for water and sediments have been completed. Additional fish will be collected to provide adequate information from each trophic level in the lake. The final report will be

completed in FY 90.

(3) Pine Creek Lake, OK. EASB completed field work on a water quality study of Pine Creek Lake. This study was initiated to obtain baseline data to relate to future impacts of clearcutting occurring on a widespread basis in the watershed, and the predicted expansion of the poultry industry in the basin. Sample collection began in April and continued biweekly thru September. No data were collected in June because the lake was about 14 feet above normal level. The final report will be completed in FY 90.

(4) Wister Lake, OK. EASB began field work on a water quality study at Wister Lake. This study was initiated to obtain baseline data to relate to the possible effects of an existing poultry plant on water quality and the potential expansion of the poultry industry in the basin. Water samples were collected biweekly June through August, and once in September. Since Wister Lake is a municipal water supply source, field work will be continued in FY 90 in order to add to the data base.

4. SEDIMENT PROGRAM AND ACTIVITIES.

a. ALBUQUERQUE DISTRICT. A sediment survey (aerial and hydrographic) of Santa Rosa Lake was completed in August 1989. The new area-capacity table for Two Rivers Reservoir, based on the 1988 survey, will be ready for adoption by 1 January 1990. The sedimentation survey reports for Two Rivers Reservoir and Santa Rosa Lake are scheduled to be completed in January 1990 and November 1990, respectively.

b. FORT WORTH DISTRICT. For FY 1990, no projects in the Fort Worth District are scheduled for resurvey as funds requested for sedimentation resurvey in FY 1990 were not approved.

c. GALVESTON DISTRICT. A sediment policy was established in 1985 by the District to provide guidance relative to settling basins or alternative control methods on inflowing streams to reduce velocity and essentially preclude the permanent deposition of sediment in the Federally-owned lands of Addicks and Barker Reservoirs. On 10 May 1989, an inspection of sediment deposition was made in the man-made channels entering Government-owned land (G.O.L.) for Langham-Horsepen and Mason Creeks, and Buffalo Bayou. The upper end of Buffalo Bayou, near Peek Road, was inspected on 24 May 1989. Sufficient sediment was found on G.O.L. in Mason Creek to warrant a physical survey, and request Harris County Flood Control District to remove the sediment. Sediment surveys were conducted to determine the amount of

sediment within the channel. Sediment on G.O.L. at Langham Creek and Buffalo Bayou was limited to a few inches. Dredging in connection with navigation is shown in the following table.

NAVIGATION PROJECTS - DREDGING
(Cubic Yards)

| Project | FY 88 | FY 89 |
|---|---|---|
| Brazos Island Harbor | - - - - | 731,545 |
| Corpus Christi Ship Channel | 6,748,053 | 1,759,912 |
| Freeport Harbor | 1,687,918 | 1,253,637 |
| Galveston Harbor & Channel | 1,039,000 | 4,032,948 |
| Houston Ship Channel | 1,379,197 | 2,125,586 |
| Matagorda Ship Channel | 2,625,072 | 5,354,812 |
| Sabine - Neches Waterway | 4,210,191 | 1,479,988 |
| Mouth of the Colorado River | 558,577 | - - - - |
| Trinity River and Tributaries | 172,886 | - - - - |
| Texas City Channel | 122,764 | - - - - |
| Cedar Bayou | - - - - | 633,636 |
| SUBTOTALS | 18,543,658 | 17,372,064 |
| GIWW | | |
| Sabine River to Galveston | 797,042 | 587,522 |
| Galveston to Corpus Christi | 2,509,816 | 8,581,996 |
| Corpus Christi to Mexican Border | 1,792,204 | 3,229,285 |
| SUBTOTALS | 5,099,062 | 12,398,803 |
| TOTALS | 23,642,720 | 29,770,867 |

d. LITTLE ROCK DISTRICT.

(1) Summary of Activities. Suspended sediment samples are collected at 16 stations. The 247 sediment ranges on the main stem of the Arkansas River are re-surveyed as near annually

as funds and survey workload permit. From October 1988 through September 1989, there were 185 ranges scheduled for resurveying; no resurveys were accomplished. There are 111 ranges scheduled to be resurveyed in FY 90. 56 tributary ranges are resurveyed less frequently when appreciable deposits are suspected. About 50 index ranges out of 350 sediment ranges in the other 8 reservoirs are resurveyed at 10-year intervals. During the period from October 1988 through September 1989, Nimrod, Blue Mountain, and Beaver were resurveyed. Index ranges are scheduled to be resurveyed at 6 reservoirs during FY90.

(2) Channel Maintenance. Maintenance dredging to maintain navigable depths amounted to approximately 1.3 million cubic yards in FY 89. For the river system this was an overall decrease of about 4.5 million cubic yards from the FY 88 dredging requirements. Dredging was performed in Pools 2 and 7, Dardanelle and Ozark Pools, and the White River Entrance Channel (WREC). Approximately 0.93 million cubic yards were dredged in the Arkansas River, 56 percent of which was from Pool 2, and approximately 0.35 million cubic yards in the WREC. Shoals in the downstream approaches of Lock Numbers 3, 4, 5, and 8 were removed by the Corps-operated Arkansas River Fleet. Approximately six groundings exceeding one hour each occurred on the navigation system in FY 89.

e. TULSA DISTRICT. During FY 89, detailed sedimentation resurveys were completed on Keystone and Birch Lakes, Oklahoma, and El Dorado Lake, Kansas. The FY 88 contract for Keystone was completed in January and the FY 89 contracts for Birch and El Dorado were completed in August. The results of these resurveys are scheduled to be completed in early FY 91. A sediment investigation of Hulah Lake, Oklahoma was initiated and the field work should be completed in November. Suspended sediment samples were collected by the U.S. Geological Survey at 39 sites.

Sediment estimates and forecasts are being performed as needed. The transfer of historical data from the SWD Honeywell computer to an in-house system is nearing completion; one major program on the Honeywell system has yet to be converted. The hydrographic survey system software was updated in September by the manufacturer.

Hydrographic surveys were conducted on El Dorado Lake, Kansas, Birch, Keystone, and Skiatook Lakes, Oklahoma, for Tulsa District and Santa Rosa Lake, New Mexico, for Albuquerque District. The hydrographic survey at Skiatook Lake was made to evaluate the entrance conditions to the outlet works. The FY 88 Elk City Lake, Kansas, reconnaissance resurvey was processed in February. Contracts were awarded to process the data from the sediment resurveys of Kaw and Wister Lakes, Oklahoma. The completed work of Elk City and Kaw Lakes have been forwarded to

the Division Office for approval. The Wister Lake work is currently under contract and scheduled to be completed on 15 December 1989. Another contract was awarded in September 1989 for re-evaluation of the segmental areas of Lake Texoma, Oklahoma and Texas. This data is required for processing the final results of the 1984/1985 sediment resurvey of the lake. The updated sediment yield study for the Upper Little Arkansas River was completed in the early months of FY 89.

5. NAVIGATION ACTIVITIES.

a. ALBUQUERQUE DISTRICT. N\A

b. FORT WORTH DISTRICT. N/A

C. GALVESTON DISTRICT. Consolidated statement of tonnage handled by ports and moving on Gulf Intracoastal Waterway is shown in the following table for calendar years 1986 and 1987 in U.S. Army Engineer District, Galveston.

| | | (SHORT TONS) CALENDAR YEAR 1986 | CALENDAR YEAR 1987 |
|---|---|---|---|
| 1. | Houston, Texas | 101,659,064 | 112,546,187 |
| 2. | Corpus Christi, Texas | 50,104,579 | 53,539,806 |
| 3. | Texas City, Texas | 35,479,909 | 37,233,420 |
| 4. | Beaumont, Texas | 27,453,660 | 29,758,759 |
| 5. | Port Arthur, Texas | 18,879,546 | 20,615,945 |
| 6. | Freeport, Texas | 13,370,117 | 13,980,280 |
| 7. | Galveston, Texas | 7,987,857 | 8,684,216 |
| 8. | Port Lavaca-Point Comfort | 4,858,515 | 4,995,099 |
| 9. | Channel to Victoria, Texas | 3,078,476 | 3,655,454 |
| 10. | Chocolate Bayou, Texas | 2,874,357 | 2,750,380 |
| 11. | Brownsville, Texas | 1,212,743 | 1,234,039 |
| 12. | Orange, Texas | 661,570 | 771,673 |
| 13. | Sabine Pass Harbor, Texas | 385,202 | 722,151 |
| 14. | Harlingen, Texas (Arroyo Colorado) | 668,733 | 718,645 |
| 15. | Colorado River, Texas | 571,818 | 693,885 |
| 16. | Johnsons Bayou | 329,759 | 587,745 |
| 17. | Dickinson, Texas | 330,172 | 420,062 |
| 18. | Sweeny, Texas (San Bernard River) | 324,528 | 360,272 |
| 19. | Port Isabel, Texas | 291,713 | 298,789 |
| 20. | Cedar Bayou, Texas | 275,900 | 247,093 |
| 21. | Rockport, Texas | - | 23,678 |
| 22. | Aransas Pass, Texas | 293,681 | 14,445 |
| 23. | Port Mansfield, Texas | 3,883 | 11,949 |
| 24. | Anahuac, Texas | 48,662 | 2,850 |
| 25. | Channel to Liberty, Texas | 43,930 | 2,850 |
| 26. | Clear Creek, Texas | - | - |
| 27. | Double Bayou, Texas | 14,145 | - |
| 28. | Palacios, Texas | - | - |
| | TOTAL | 271,202,519 | 293,869,672 |
| Gulf Intracoastal Waterway, Texas: (Traffic on Waterway) | | | |
| Sec. 1. | (Sabine River to Galveston) | 47,401,050 | 46,942,071 |
| Sec. 2. | (Galveston to Corpus Christi) | 23,809,550 | 23,055,688 |
| Sec. 3. | (Corpus Christi to Mexican Border) | 1,723,040 | 1,862,826 |
| | TOTAL | 72,933,640 | 71,860,585 |

PRELIMINARY AND SUBJECT TO REVISION

d. LITTLE ROCK DISTRICT. The effects of the 1988 drought continued into FY 89. Extremely low stages on the WREC persisted through the first half of November. FY 89 began with navigation on the WREC restricted to daylight hours only with tow size restricted to 85 feet wide by 600 feet long (including towboat) was restored on 14 November 1988. There have been no further navigation restrictions on the McClellan-Kerr Arkansas River Navigation System for the remainder of FY 89.

Projections indicate that about 9.0 million tons of commerce will be moved on the McClellan-Kerr Arkansas River Navigation System in CY 89. This represents a decrease of 16 percent from the CY 88 level. Commodities moved consisted of iron and steel, chemicals and chemical fertilizers, petroleum products, coal, sand and gravel, rock, soybeans, wheat and other grains, and miscellaneous commodities. Inbound movements are predicted to decrease by 16 percent and outbound movements to decrease by 31 percent.

| | 1988* (Tons) | 1989** (Tons) |
|---|---|---|
| Inbound | 2,087,140 | 2,430,000 |
| Outbound | 2,086,949 | 4,050,000 |
| Internal | 2,107,237 | 1,980,000 |
| Through | 507,008 | 540,000 |
| Totals | 7,788,334 | 9,000,000 |

* Unofficial figures
** Projected figures

e. TULSA DISTRICT. Commercial movements in Oklahoma for FY 1989 experienced an eighteen percent (18%) increase over the tonnages moved in FY 1988. Navigation conditions were vastly improved in FY 89 over those experienced in FY 88, which began with high flows in the winter and spring months, followed abruptly by the drought in the summer of 1988. Chemical fertilizer, wheat, petroleum products, and iron and steel continue to be the leading commodities shipped on the waterway. Movements of military equipment have increased steadily. The following table provides the total tonnage for FY 88 and 89 for both the Little Rock and Tulsa Districts.

MCCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM
(Total Tonnage Little Rock and Tulsa Districts)

| | FY 1988 * (Tons) | FY 1989 * (Tons) |
|---|---|---|
| Inbound | 2,100,925 | 2,233,028 |
| Outbound | 3,119,729 | 3,764,409 |
| Internal | 2,399,952 | 1,756,897 |
| Through | 536,053 | 447,506 |
| Totals | 8,156,659 | 8,201,840 |

* Unofficial figures

6. COOPERATIVE PROGRAMS

a. ALBUQUERQUE DISTRICT.

(1). National Weather Service. The Albuquerque District does not have a cooperative program with the National Weather Service.

(2). U.S. Geological Survey. The Cooperative Stream Gaging Program with the U.S. Geological Survey covered 42 stations in FY 89. Station costs are summarized on page VI-52. Total program cost was $200,190. The following is a summary of number of stations by river basin:

STATION SUMMARY

STATIONS

| BASIN | STREAM | RESERVOIR | TOTAL |
|---|---|---|---|
| ARKANSAS | 3 | 2 | 5 |
| Canadian | 3 | 2 | 5 |
| Rio Grande | 11 | 8 | 19 |
| Pecos | 9 | 4 | 13 |

Note: 6 gages are not associated with project operation.

b. FORT WORTH DISTRICT.

(1) National Weather Service. Funds were transferred by CESWF to the NWS in the amount of $99,041 for FY 1989. Under ongoing programs, the Corps collects rainfall at project offices while the NWS collects all other rainfall reports and maintains weather stations, including those at Corps' projects. Rainfall

summaries are transmitted to the Corps via telephone and a daily computer printed map which displays current totals for reporting stations, supplemental and accumulative storm total printouts are provided upon request. Additional hydrometeorological information was received from the NWS via AFOS. Radar scans were obtained on a Kavouras radar acquisition access and display terminal via a direct connection to the NWS Stephenville radar site (which covers the geographic area where the majority of the District's projects are concentrated). Continuous updates are possible during storm periods.

(2) U. S. Geological Survey.

a. General.

The USGS performed maintenance and operated all streamflow, lake level, and some water quality stations in cooperation with the Fort Worth District. They arranged for reporting at river stages during flood events, made supplemental flow measurements, and processed all published data. In addition to the cooperative streamgaging program, the USGS under memorandum of agreement provided operation and maintenance service to the Fort Worth District Data Collection Platform network.

b. Funds.

The Fort Worth District transferred to the USGS, for the Cooperative Streamgaging Program, $662,860 for FY 1989. page VI-53 indicates the number of stations and the funds provided by both the USGS and the COE toward the total station costs. Total program cost for FY 1990 will be $750,360.

c. GALVESTON DISTRICT.

(1) U. S. Geological Survey - Two cooperative programs are currently in existence with the USGS. One provides the operation and maintenance of stream gages and the second provides the operation and minor maintenance for Data Collection Platforms. The total program cost for FY 1989 was $177,170. The total program cost for FY 1990 will be $186,870. Station costs are summarized on page VI-54.

(2) National Weather Service - The cooperative program with the NWS provides for the operation and maintenance of precipitation gages and for the transmission of rainfall summaries. The total program cost for FY 1989 was $7,126. The total program cost for FY 1990 will be $6,785.

d. LITTLE ROCK DISTRICT. Approximately 205 rainfall and/or river stage reporting stations were operated by the National Weather Service in or near the Little Rock District. Of these, 120 stations are in the Corps of Engineers/National Weather Service cooperative network. The remaining 85 stations are operated within the National Weather Service FC-1 network. Reports from these stations are used in forecasting streamflows for flood warnings and operation of reservoir projects. Six of these stations are airway stations that report at 6-hour intervals. There were six automated rainfall gages (LARCs) installed in northern Arkansas in the FC-16 network this fiscal year. Three of these are additional stations. The cost for installation of the LARC gages was $21,200. This cost was by interagency agreement between the National Weather Service (NWS) and COE. Nine LARC rainfall gages are scheduled to be installed in southern Missouri within the FC-16 network in FY 90. Five of these will be additional stations. These installation cost is estimated at $30,000 and will be funded by an interagency agreement. The FY 89 total operational and maintenance cost for the NWS/COE cooperative program was $41,490. The FY 90 operation and maintenance cost of the cooperative program is projected to be approximately $46,000 and will include operation and maintenance of the 15 LARC stations.

The streamgaging data required by the District is collected under a cooperative agreement with the USGS. During the fiscal year 114 stations were operated of which 97 were DCP's. Of these, 74 were operated cooperatively and 40 were operated by the Corps of Engineers. The FY 89 total cost for collection of streamflow and sediment data was $562,050 of which $398,340 was transferred to the USGS. The FY 90 cooperative program cost is estimated at $581,715 of which $416,080 will be transferred to USGS. Station costs are shown in page VI-55.

e. TULSA DISTRICT.

(1) National Weather Service. Real-time water control and investigation and design of our water resources projects require the measurement and reporting of rainfall and evaporation data. These data are provided through a cooperative program with the National Weather Service. During FY 1989, the rainfall and evaporation program in the Tulsa District cost $125,931 through transfer of funds to the National Weather Service.

(2) U.S. Geological Survey. Much of the information required for water control, hydrologic investigation, and design of water resources projects results from the reporting and measurement of flow, water quality, and sediment provided by a cooperative stream gaging program with the USGS. During FY 1989, this cooperative program included 195 stations, four of which were operated independently by the Corps of Engineers. The stream gaging program in the Tulsa District cost $1,723,465 in FY

1989 with $1,058,680 of this being transferred to the USGS for operation of stations and data publications as shown in Table VI-11. The total CE/USGS program cost for FY 1990 will be $1,100,000. Station costs are shown in page VI-56

7. ANNUAL FLOOD DAMAGES PER RIVER BASIN PREVENTED BY BOTH CORPS AND SECTION 7 PROJECTS

a. ALBUQUERQUE DISTRICT. The following is a listing of damages prevented by Corps and Section 7 projects during FY 89.

Damages Prevented in Thousands of Dollars

| Basin | Project | FY 89 Damages Prevented | Cumulative Benefits Through FY |
|---|---|---|---|
| Arkansas | John Martin | 0 | 87,609 |
| | Pueblo | 0 | 2,852 |
| | Trinidad | 0 | 0 |
| Canadian | Conchas | 0 | 81 |
| Rio Grande | Abiquiu | 28 | 229,368 |
| | Cochiti | 0 | 249,834 |
| | Galisteo | 0 | 0 |
| | Jemez Canyon | 0 | 10,639 |
| | Platoro | 0 | 4,508 |
| | Rio Grande Fldw. | 0 | 44,011 |
| | Alb. Div. Channel | 2,506 | 80,280 |
| Pecos | Santa Rosa | 6 | 13 |
| | Sumner | 0 | 0 |
| | Two Rivers | 215 | 7,077 |
| | Brantley | 0 | 0 |
| San Juan | Navajo | 0 | 50 |

b. FORT WORTH DISTRICT. Annual flood damages prevented by river basin and project for both Corps' and Section 7 lakes are shown in the following table. The table presents the damages prevented for both FY 1989 and cumulative through FY 1989.

## ANNUAL FLOOD DAMAGES PREVENTED

| PROJECT | FY89 DAMAGES PREVENTED (in $1,000's) | CUMULATIVE BENEFITS THROUGH FY89 (in $1,000's) |
|---|---|---|
| BRAZOS RIVER BASIN | | |
| AQUILLA | $1,358.0 | $ 2,592.0 |
| BELTON | 8,121,0 | 126,718.7 |
| GEORGETOWN | 753.3 | 5,363.5 |
| GRANGER | 3,699.8 | 18,184.0 |
| PROCTOR | 494.2 | 9,227.6 |
| SOMERVILLE | 782.9 | 32,976.9 |
| STILLHOUSE | 2,666.4 | 28,027.3 |
| WACO | 6,579.2 | 66,633.1 |
| WHITNEY | 25,253.9 | 160,030.9 |
| SUBTOTAL | $49,708.8 | $449,754.0 |
| COLORADO RIVER BASIN | | |
| HORDS CREEK | $0.0 | $ 937.0 |
| O. C. FISHER | 0.0 | 2,375.6 |
| SUBTOTAL | $0.0 | $ 3,312.6 |
| GUADALUPE-SAN ANTONIO RIVER BASIN | | |
| CANYON | $0.0 | $ 58,878.3 |
| SAN ANTONIO | 0.0 | 117,514.9 |
| SUBTOTAL | $0.0 | $176,393.2 |

(cont.)

| PROJECT | FY89 DAMAGES PREVENTED (in $1,000's) | CUMULATIVE BENEFITS THROUGH FY89 (in $1,000's) |
|---|---|---|
| NECHES RIVER BASIN | | |
| SAM RAYBURN | $100,316.4 | $ 230,572.1 |
| SUBTOTAL | $100,316.4 | $ 230,572.1 |
| RED RIVER BASIN | | |
| LAKE O' THE PINES | $ 190.0 | $ 6,826.0 |
| WRIGHT PATMAN | 0.0 | 13,859.4 |
| SUBTOTAL | $ 190.0 | $ 20,685.4 |
| TRINITY RIVER BASIN | | |
| BARDWELL | $ 70.2 | $ 9,182.9 |
| BENBROOK 1/ | 51,115.2 | 102,565.3 |
| BIG FOSSIL | 1,525.0 | 7,847.8 |
| GRAPEVINE 2/ | 221,370.6 | 1,164,572.8 |
| JOE POOL | 25,927.9 | 27,692.7 |
| LAVON | 19,609.5 | 110,644.6 |
| NAVARRO MILLS | 435.1 | 23,167.1 |
| SUBTOTAL | $320,054.2 | $1,450,673.2 |
| GRAND TOTAL | $470,269.4 | $2,331,390.5 |
| COLORADO RIVER BASIN 3/ | | |
| MARSHALL FORD | $ 0.0 | $191,415.6 |
| TWIN BUTTES | 0.0 | 418.0 |
| SUBTOTAL | $ 0.0 | $191,833.6 |
| GRAND TOTAL | $470,269.4 | $2,523,224.1 |

1/ Includes Fort Worth Floodway System
2/ Includes Ray Roberts, Lewisville and Dallas Floodway System
3/ Built by Bureau of Reclamation
but under Corps Flood Control Jurisdiction

c. GALVESTON DISTRICT. Damages prevented for river and stream projects were impacted by the near drought conditions of FY 1989. The cumulative total of flood damages prevented at the Addicks

and Barker projects is $222,188,000. The cumulative total of flood damages prevented for all Corps projects in the District is $893,686,000.

| | Flood Damages Prevented ($000) Total for FY 89 | Cumulative Total |
|---|---|---|
| Addicks and Barker | 60,434 | 222,188 |
| Brays Bayou | 2,960 | 211,637 |
| White Oak Bayou | 86 | 21,003 |
| Lavaca-Navidad Rivers | 0 | 637 |
| Tranquitas Creek | 0 | 5,333 |
| San Diego Creek | 0 | 2,908 |
| Texas City, Texas (Hurricane-Flood) | 0 | 10,614 |
| Colorado River, Matagorda | 0 | 844 |
| Galveston Seawall | 0 | 400,000 |
| Vince Bayou | 1,940 | 4,522 |
| Port Arthur (Hurricane-Flood) | 0 | 6,000 |
| Freeport (Hurricane-Flood and Tide Gate) | 0 | 8,000 |
| Nueces River (Three Rivers) | 0 | 0 |
| Highland Bayou | 0 | 0 |
| Total | 65,420 | 893,686 |

d. LITTLE ROCK DISTRICT. The annual flood damages prevented by river basin during FY 89 in the Little Rock District are shown in the following table:

| Basin | FY 89 Damages Prevented |
|---|---|
| Arkansas River | |
| Little Rock District projects | $ 11,138,000 |
| White River | |
| Little Rock District projects | 11,951,000 |
| Little River | |
| Little Rock District projects | 2,029,000 |
| TOTALS FY 89 | $ 25,118,000 |

e. TULSA DISTRICT. Flood damages prevented by the Tulsa District Lakes in the Arkansas and Red River Basins during FY 1989 are shown in the following table and amount to $161,174,000.

| ARKANSAS RIVER BASIN | FY 89 | CUMULATIVE THROUGH FY 89 |
|---|---|---|
| Arcadia | ------- | 1,065,000 |
| Big Hill | 42,000 | 483,000 |
| Birch | 3,589,000 | 12,467,000 |
| Canton | 139,000 | 8,485,000 |
| Cheney | 343,000 | 14,507,000 |
| Copan | 30,574,000 | 135,559,000 |
| Council Grove | 92,000 | 17,849,000 |
| El Dorado | 38,000 | 15,273,000 |
| Elk City | 6,038,000 | 61,625,000 |
| Eufaula | 17,978,000 | 88,992,000 |
| Fall River | 1,301,000 | 43,987,000 |
| Fort Gibson | 2,144,000 | 48,996,000 |
| Fort Supply | 2,000 | 3,171,000 |
| Great Salt Plains | 311,000 | 39,952,000 |
| Heyburn | 4,000 | 7,685,000 |
| Hulah | 33,898,000 | 253,923,000 |
| Iola | 537,000 | 14,734,000 |
| John Redmond | 2,375,000 | 89,114,000 |
| Jenks | ------- | 2,618,000 |
| Kaw | 3,759,000 | 270,208,000 |
| Keystone | 2,681,000 | 412,875,000 |
| Marion | 276,000 | 37,965,000 |
| Markham Ferry | 402,000 | 8,915,000 |
| Norman | 2,140,000 | 14,656,000 |
| Oologah | 10,537,000 | 103,841,000 |
| Optima | ------- | 11,000 |
| Pensacola | 2,010,000 | 51,394,000 |
| Sanford | ------- | 162,000 |
| Skiatook | 12,108,000 | 51,309,000 |
| Tenkiller | 1,360,000 | 19,313,000 |
| Toronto | 2,140,000 | 45,232,000 |
| Tulsa & West Tulsa | ------- | 261,372,000 |
| Wister | 6,797,000 | 91,674,000 |
| Total Arkansas Basin | 143,615,000 | 2,229,400,000 |

(cont.)

| RED RIVER BASIN | FY 1989 | CUMULATIVE THRU FY 1989 |
|---|---|---|
| Altus | 1,145,000 | 5,874,000 |
| Arbuckle | 10,000 | 462,000 |
| Broken Bow | 1,063,000 | 16,800,000 |
| Denison | 2,398,000 | 66,979,000 |
| Fort Cobb | 183,000 | 916,000 |
| Foss | 1,278,000 | 4,089,000 |
| Hugo | 713,000 | 8,999,000 |
| Lake Kemp | 932,000 | 4,102,000 |
| Mountain Park | 134,000 | 753,000 |
| Pat Mayse | 782,000 | 5,107,000 |
| Pine Creek | 4,749,000 | 17,609,000 |
| Sardis | 1,622,000 | 8,221,000 |
| Waurika | 2,550,000 | 24,825,000 |
| Total Red River Basin | 17,559,000 | 164,737,000 |
| Grand Total | 161,174,000 | 2,394,137,000 |

8. ANNUAL FLOOD DAMAGES BY STATE PREVENTED BY CORPS PROJECTS

a. ALBUQUERQUE DISTRICT

| STATE | FY 89 Damages Prevented In Thousands of Dollars |
|---|---|
| Colorado | 0 |
| New Mexico | 2,755 |
| Kansas | 0 |

b. FORT WORTH DISTRICT. Flood damages prevented by Corps projects during FY 1989 in the state of Texas were $470,269,400.

c. GALVESTON DISTRICT. Annual flood damages prevented in the state of Texas by Corps projects were $65,420,000.

d. LITTLE ROCK DISTRICT. The annual flood damages prevented in each state served by the Little Rock District during FY 89 is shown in the following table:

| State | FY 89 Damages Prevented |
|---|---|
| Arkansas | |
| Levees, Arkansas River (Little Rock District) | $ 9,426,000 |
| Reservoirs, Arkansas River (Little Rock District) | 1,712,000 |
| Levees, White River (Little Rock District) | 3,693,000 |
| Reservoirs, White River (Little Rock District) | 6,430,000 |
| Reservoirs, Little River (Little Rock District) | 2,029,000 |
| Arkansas Total | $ 23,290,000 |
| Missouri | |
| Levees, White River (Little Rock District) | 0 |
| Reservoirs, White River (Little Rock District) | 1,828,000 |
| Missouri Total | $ 1,828,000 |
| TOTAL DAMAGES PREVENTED FOR FY 89 | $ 25,118,000 |

e. TULSA DISTRICT. Annual flood damages prevented by Corps projects in FY 1989 for the state of Kansas amounted to $13,182,000; for Oklahoma, $123,272,000; for Arkansas, $23,006,000; and for Texas, $1,714,000.

9. Annual Flood Damages By State Prevented by Corps Supported Emergency Operations

a. ALBUQUERQUE DISTRICT. None

b. FORT WORTH DISTRICT. None

c. GALVESTON DISTRICT. None

d. LITTLE ROCK DISTRICT. The flood damages prevented in FY 89 by Emergency Operations occurred primarily during the months of November 1988 and February 1989. Record rainfalls caused flash flooding and rises along major tributaries. These rises were of short duration and no prolonged or general flooding occurred as occurred in east Texas in May 89. Emergency

assistance consisted of levee patrolling and sandbagging in Jackson County in Arkansas. Levee patrolling and technical assistance was provided in the Poplar Bluff area of the Black River in November 1988. Flood damages prevented in Missouri as a result of technical assistance, levee patrolling is estimated. Sandbag operations and other activities in Arkansas are as follows:

| Location | Description | Damages Prevented |
|---|---|---|
| White River | Sandbagging Ops in Jackson County | $140,000 |
| Black River | Sandbagging Ops at Corning, AR | $ 70,000 |
| Black River | Levee patrolling and gate closure warnings | $125,000 |
| Arkansas River | Navigation Warnings | $100,000 |
| TOTAL DAMAGES PREVENTED | | $435,000 |
| TOTAL COST OF EMERGENCY OPERATIONS | | $ 2,125 |

e. TULSA DISTRICT. Not available.

f. HYDROPOWER PRODUCTION.

ALBUQUERQUE DISTRICT. On 17 Apr 86 Los Alamos County, New Mexico was issued a Federal Energy Regulatory Commission (FERC) license (non-Federal) for hydropower development at Abiquiu Dam. Construction of the hydropower project was started in Apr 87 and is now about 95% complete. The plant has a capacity of 11 MW and was scheduled for operation by May 89, but a construction problem with the installation of the turbines has delayed the scheduled start up date.
The plant is now scheduled for operation by mid 1990.

b. FORT WORTH DISTRICT. Hydropower production by project for Fiscal Years 1985 through 1989 is shown in the following table.

| Project | Gross Generation (MWH) | Fiscal Year |
|---|---|---|
| Canyon | 8,156 | 1989 |
| Sam Rayburn | 53,841 | 1989 |
| | 110,577 | 1988 |
| | 147,319 | 1987 |
| | 106,726 | 1986 |
| | 97,971 | 1985 |
| Town Bluff | 81 | 1989 |
| Whitney | 111,241 | 1989 |
| | 18,152 | 1988 |
| | 110,216 | 1987 |
| | 51,900 | 1986 |
| | 57,529 | 1985 |

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. The annual hydropower production at LRD plants in total GWH by fiscal year is shown in the following table:

| Project | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|
| Beaver | 224.1 | 215.8 | 156.6 | 192.4 | 159.9 |
| Table Rock | 888.3 | 648.2 | 434.7 | 636.3 | 706.3 |
| Bull Shoals | 402.9 | 880.5 | 572.2 | 897.2 | 703.8 |
| Norfork | 397.3 | 215.9 | 127.8 | 223.9 | 216.6 |
| Greers Ferry | 317.3 | 150.6 | 106.9 | 201.8 | 240.5 |
| Ozark | 439.9 | 490.6 | 343.9 | 334.6 | 407.8 |
| Dardanelle | 826.9 | 802.8 | 833.3 | 601.8 | 479.1 |
| Totals(GWH) | 4496.7 | 3404.4 | 2575.4 | 3088.0 | 2914.0 |

e. TULSA DISTRICT. Hydropower generation at Tulsa District projects for FY 1985 through 1989 is shown in the following table.

HYDROPOWER PRODUCTION
FOR TULSA DISTRICT PROJECTS

NET ANNUAL GENERATION (GWH)

| PROJECT | FY 1985 | FY 1986 | FY 1987 | FY 1988 | FY 1989 |
|---|---|---|---|---|---|
| Denison | 343 | 295 | 533 | 193 | 310 |
| Broken Bow | 230 | 147 | 88 | 107 | 175 |
| Sub-Total | 573 | 442 | 621 | 300 | 485 |
| Keystone | 307 | 333 | 501 | 180 | 255 |
| Fort Gibson | 322 | 295 | 288 | 138 | 212 |
| Webbers Falls | 321 | 351 | 287 | 103 | 264 |
| Tenkiller Ferry | 176 | 172 | 148 | 75 | 121 |
| Eufaula | 360 | 336 | 461 | 198 | 304 |
| Robert S. Kerr | 751 | 726 | 773 | 371 | 548 |
| Sub-Total | 2,237 | 2,213 | 2,458 | 1,065 | 1,704 |
| TOTAL | 2,810 | 2,655 | 3,079 | 1,365 | 2,189 |

11. Lake Attendance.

a. ALBUQUERQUE DISTRICT. The following is a listing of attendance at Corps and Section 7 projects in the Albuquerque District.

Project Attendance in Thousands

| Project | Year 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|
| Abiquiu | 331.9 | 571.4 | 406.5 | 512.3 | 547.1 |
| Cochiti | 716.6 | 978.1 | 819.7 | 867.2 | 905.6 |
| Conchas | 449.7 | 586.7 | 408.8 | 625.0 | 581.2 |
| Galisteo | 7.6 | 8.3 | 5.8 | 5.9 | 5.1 |
| Jemez Canyon | 51.0 | 53.5 | 53.3 | 58.9 | 55.6 |
| John Martin | 742.5 | 702.9 | 1,012.7 | 754.3 | 467.4 |
| Santa Rosa | 248.2 | 233.3 | 191.6 | 156.1 | 126.1 |
| Trinidad | 275.4 | 274.3 | 282.1 | 395.9 | 299.0 |
| Two Rivers | 62.7 | 17.6 | 13.2 | 11.3 | 12.0 |
| Pueblo | 1,335.4 | 1,509.1 | 1,476.5 | 1,365.1 | 1460.4 |
| Platoro | 17.4 | 13.2 | 8.4 | 8.8 | 8.8 |
| Sumner | 129.7 | 138.3 | 95.5 | 106.2 | 111.1 |
| Navajo | 486.2 | 527.6 | 417.0 | 479.0 | 416.5 |

b. FORT WORTH DISTRICT. Lake Attendance for both the Fort Worth District Corps' lake and the Section 7 lakes is presented in the following table. The attendance is presented for the period FY 1985 through FY 1989.

PROJECT ATTENDANCE IN THOUSAND

| PROJECT | 1985 | 1986 | 1987 | 1988 | 1989* |
|---|---|---|---|---|---|
| Aquilla | 100.4 | 104.1 | 105.0 | 106.1 | 110.2 |
| Bardwell | 984.7 | 769.6 | 780.0 | 801.0 | 263.1 |
| Belton | 2,307.5 | 2,504.1 | 2,600.0 | 2,701.0 | 2,227.0 |
| Benbrook | 2,504.1 | 2,584.6 | 2,700.0 | 2,570.0 | 1,201.0 |
| Canyon | 2,316.8 | 2,429.2 | 2,000.0 | 2,170.0 | 1,120.6 |
| Georgetown | 1,064.7 | 970.5 | 800.0 | 950.0 | 424.0 |
| Granger | 322.1 | 325.6 | 340.0 | 350.0 | 203.5 |
| Grapevine | 4,315.3 | 4,077.7 | 4,200.0 | 4,450.0 | 1,552.3 |
| Hords Creek | 578.0 | 437.0 | 450.0 | 600.0 | 149.9 |
| Joe Pool | -- | -- | 2.0 | 3.0 | 18.3 |
| Lake O'The Pines | 2,392.2 | 2,434.8 | 2,400.0 | 2,750.0 | 1,255.9 |
| Lavon | 4,072.5 | 3,652.9 | 3,700.0 | 3,950.0 | 1,401.4 |
| Lewisville | 5,752.4 | 7,204.3 | 7,300.0 | 6,990.0 | 2,233.8 |
| Navarro Mills | 1,540.5 | 1,319.5 | 1,400.0 | 1,450.0 | 836.5 |
| O.C. Fisher | 787.3 | 534.7 | 550.0 | 610.0 | 421.2 |
| Proctor | 962.7 | 928.2 | 940.0 | 965.0 | 1,342.8 |
| Ray Roberts | -- | -- | 1.0 | 2.0 | 3.1 |
| Sam Rayburn | 3,258.3 | 3,319.6 | 3,400.0 | 3,550.0 | 2,741.2 |
| Somerville | 1,639.8 | 1,380.0 | 1,400.0 | 1,460.0 | 2,108.8 |
| Stillhouse Hollow | 915.2 | 1,206.3 | 1,300.0 | 1,250.0 | 553.5 |
| Town Bluff | 707.7 | 589.2 | 600.0 | 625.0 | 796.8 |
| Waco | 4,500.9 | 4,891.2 | 4,900.0 | 4,875.0 | 1,975.5 |
| Whitney | 2,249.7 | 2,350.2 | 3,400.0 | 2,750.0 | 1,888.2 |
| Wright Patman | 2,320.3 | 3,072.6 | 3,100.0 | 2,990.0 | 4,441.2 |
| Marshall Fork | | NOT AVAILABLE | | | |
| Twin Buttes | | NOT AVAILABLE | | | |

* Vehicles per year

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. Annual lake attendance at all LRD projects by calendar year is shown in the following table:

1985 - 42,700,000 visitor days
1986 - 44,128,000 " "
1987 - 47,000,000 " "
1988 - 189,763,000 visitor hours
1989 - 172,685,000 " "

e. TULSA DISTRICT. Lake attendance figures for calendar years 1984 through September 1989 are tabulated in the table on page VI-45a. Official visitation figures have recently been converted to a visitor hour basis (estimated number of hours spent by all visitors to the project). The 1984 and 1985 figures are shown in recreation days (estimated number of persons visiting the project for any length of time). The 1986 figures are shown in both visitor hours and recreation days of use, and 1987, 1988 and 1989 figures are shown in the visitor hours only.

12. WATER SUPPLY STORAGE.

a. ALBUQUERQUE DISTRICT. Cochiti, Galisteo, Jemez Canyon and Two Rivers projects do not have storage allocated for water supply. The following table is a listing of reservoirs with space allocated.

Storage in Thousands of Acre-Feet

| Project | Storage Allocated | Amount Contracted | Number of Contracts | Water Supplied FY 88 | Water Supplied FY 89 |
|---|---|---|---|---|---|
| Conchas | 254 | 0 | 0 | 32.7 | 47.1 |
| John Martin | 345 | 0 | 0 | 213.1 | 89.5 |
| Santa Rosa | 200 | 0 | 0 | 57.8 | 78.5 |
| Trinidad | 20 | 0 | 0 | 35.3 | 22.9 |
| Abiquiu | 200 | 170.9 | 1 | 0 | 0 |

b. FORT WORTH DISTRICT. Water supply information by project is shown in the following table.

TULSA DISTRICT
ATTENDANCE AT CORPS OF ENGINEERS
PROJECTS (THOUSANDS)

| PROJECT | 1984 rec.days | 1985 rec.days | 1986 rec.days | CY 1986 | CY 1987 | CY 1988 | CY 1989* |
|---|---|---|---|---|---|---|---|
| Great Salt Plains | 297.4 | 328.2 | 432.9 | 6059.2 | 7204.0 | 4582.0 | 3890.0 |
| Fort Supply | 898.7 | 860.5 | 729.5 | 4295.4 | 8903.0 | 7410.0 | 3841.0 |
| Canton | 2738.1 | 2625.0 | 2706.1 | 24764.0 | 33595.0 | 16944.0 | 14142.0 |
| Hulah | 428.7 | 357.7 | 337.8 | 1634.3 | 3818.0 | 1293.0 | 733.0 |
| Tenkiller | 2065.1 | 2182.0 | 2379.1 | 42435.4 | 49419.0 | 49192.0 | 17624.0 |
| Wister | 971.1 | 838.2 | 771.6 | 7752.6 | 10785.0 | 8786.0 | 10639.0 |
| Keystone | 2627.3 | 3262.6 | 3240.9 | 6399.9 | 14634.0 | 12734.0 | 9059.0 |
| Oologah | 3003.4 | 2837.1 | 2300.0 | 23031.6 | 21436.0 | 19546.0 | 9575.0 |
| Fort Gibson | 3881.8 | 4933.9 | 4493.7 | 62783.8 | 77190.0 | 51397.0 | 30072.0 |
| Fall River | 209.7 | 192.5 | 228.3 | 2797.1 | 2241.0 | 2227.0 | 1217.0 |
| Toronto | 145.6 | 161.9 | 197.2 | 4357.0 | 3511.0 | 3216.0 | 2226.0 |
| Elk City | 253.1 | 281.2 | 280.2 | 7886.3 | 3508.0 | 2535.0 | 1511.0 |
| Optima | 178.1 | 141.1 | 131.4 | 421.2 | 346.0 | 221.0 | 177.0 |
| Pat Mayse | 370.1 | 386.8 | 456.9 | 3753.9 | 3768.0 | 2443.0 | 1557.0 |
| Eufaula | 4162.5 | 4607.3 | 4154.5 | 57851.1 | 70942.0 | 36180.0 | 33967.0 |
| Heyburn | 275.0 | 280.2 | 269.8 | 1847.4 | 1893.0 | 1465.0 | 842.0 |
| Hugo | 937.3 | 917.2 | 846.4 | 4472.0 | 5746.0 | 2117.0 | 1919.0 |
| Texoma | 8342.3 | 8683.5 | 8479.1 | 141609.5 | 179969.0 | 112274.0 | 83038.0 |
| Waurika | 850.3 | 829.6 | 843.3 | 4495.3 | 5163.0 | 7197.0 | 5002.0 |
| John Redmond | 313.5 | 242.0 | 296.2 | 1654.4 | 1915.0 | 1418.0 | 868.0 |
| Council Grove | 512.0 | 473.9 | 473.2 | 7801.4 | 8769.0 | 10385.0 | 3731.0 |
| Broken Bow | 861.0 | 949.2 | 906.3 | 25638.7 | 26556.0 | 15693.0 | 13223.0 |
| Marion | 235.3 | 325.1 | 317.0 | 5280.9 | 5793.0 | 4601.0 | 3427.0 |
| Pine Creek | 847.9 | 849.7 | 983.7 | 11949.7 | 7285.0 | 2959.0 | 4949.0 |
| Robert S. Kerr | 1042.9 | 1031.6 | 1128.2 | 5807.4 | 6382.0 | 3230.0 | 3508.0 |
| W.D. Mayo L&D | 221.0 | 197.1 | 224.0 | 890.6 | 975.0 | 451.0 | 265.0 |
| Chouteau L&D | 421.6 | 373.3 | 348.4 | 3160.4 | 3915.0 | 2964.0 | 1271.0 |
| Newt Graham L&D | 458.6 | 338.8 | 239.1 | 2347.6 | 2423.0 | 1432.0 | 1213.0 |
| Webbers Falls | 942.5 | 1111.4 | 917.1 | 13530.2 | 12502.0 | 6062.0 | 4835.0 |
| Birch | 343.1 | 241.6 | 246.6 | 1535.1 | 1414.0 | 1261.0 | 459.0 |
| Kaw | 1051.0 | 1139.0 | 1317.9 | 586.4 | 5599.0 | 13048.0 | 6854.0 |
| Big Hill | 431.4 | 472.4 | 396.2 | 2047.2 | 2096.0 | 4346.0 | 4487.0 |
| Sardis | 311.9 | 316.1 | 310.3 | 2215.3 | 1586.0 | 6373.0 | 3719.0 |
| El Dorado | 503.1 | 525.3 | 772.6 | 958.2 | 7678.0 | 4630.0 | 4200.0 |
| Copan | 214.4 | 209.4 | 213.8 | 1051.4 | 1873.0 | 228.0 | 462.0 |
| Skiatook | | | 408.8 | 4321.7 | 4097.0 | 2845.0 | 4963.0 |
| Arcadia | | | | | | 1650.0 | 2345.0 |
| DISTRICT TOTAL | 41330.0 | 43503.3 | 42390.0 | 509923.6 | 604829.0 | 425335.0 | 295790.0 |

*Total for January through September 1989.

| Project Name | Storage Contracted (AC-FT) | Storage Allocated (AC-FT) | Number Contracted (USERS) | Water Supplied In FY 89 (AC-FT) |
|---|---|---|---|---|
| Aquilla Lake | 33,600 | 52,480 | 1 | 2,000 |
| B. A. Steinhagen Lake | 1/ | 1/ | 1 | 1,889,600 |
| Bardwell Lake | 21,400 | 42,800 | 1 | 3,900 |
| Belton Lake | 372,700 | 372,700 | 2 | 49,200 |
| Benbrook Lake | 23,708 2/ | 23,708 2/ | 1 | 4,900 |
| Canyon Lake | 366,400 | 366,400 | 1 | 163,300 |
| Georgetown Lake | 101 | 29,200 | 1 | 6,600 |
| Granger Lake | 0 | 37,900 | 1 | 0 |
| Grapevine Lake | 161,250 | 161,250 | 3 | 30,600 |
| Hords Creek Lake | 5,780 | 5,780 | 1 | 250 |
| Joe Pool Lake | 0 | 142,900 | 1 | 790 |
| Lake O'The Pines | 250,000 | 250,000 | 1 | 12,500 |
| Lavon Lake | 220,000 | 220,000 3/ | 1 | 151,800 |
| Lewisville Lake | 436,000 | 436,000 | 2 | 138,500 |
| Navarro Mills Lake | 53,200 | 53,200 | 1 | 6,800 |
| O.C. Fisher Lake | 80,400 | 80,400 | 1 | 7,200 |
| Proctor Lake | 31,400 | 31,400 | 1 | 8,700 |
| Ray Roberts | 749,200 | 749,200 | 2 | 0 |
| Sam Rayburn Reservoir | 43,000 1/ | 43,000 | 2 | 0 |
| Somerville Lake | 143,900 | 143,900 | 1 | 2,300 |
| Stillhouse Hollow Lake | 204,900 | 204,900 | 1 | 5,800 |
| Waco Lake | 104,100 | 104,100 | 2 | 74,000 |
| Whitney Lake | 50,000 | 50,000 | 1 | 20,200 |
| Wright Patman Lake | 91,263 | 91,263 | 1 | 32,900 |

1/ LNVA is permitted to withdraw from B. A. Steinhagen Lake not to exceed 2,000 c.f.s. This lake acts a a reregulation dam to Sam Rayburn Reservoir.

2/ Remaining 48,702 ac-ft of navigation storage is in the process of being negotiated with water user.

3/ NTMWD has given assurances for an additional 160,000 ac-ft of storage in Lavon Lake

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. Water supply allocations, contracts and usages for FY88 and FY89 are shown by project in the following table:

| Project | Amount of storage allocated (ac-ft) | Amount of storage contracted (ac-ft) | Number of contracts | Amount supplied (ac-ft) FY 88 | FY 89 |
|---|---|---|---|---|---|
| Beaver | 117,000 | 40,000 | 2 | 34,084 | 34,358 |
| Norfork | 2,400 | 2,400 | 1 | 2,624 | 2,586 |
| Greers Ferry | 3,215 | 1,125 | 2 | 1,870 | 1,519 |
| Nimrod | 33 | 33 | 1 | 87 | 67 |
| DeQueen | 17,900 | 0 | 0 | 0 | 0 |
| Gillham | 20,600 | 123 | 1 | 627 | 762 |
| Dierks | 10,100 | 190 | 1 | 254 | 266 |
| Millwood | 150,000 | 32,828 | 1 | 54,187 | 55,112 |

e. TULSA DISTRICT. Storage allocated to water supply totals 3,840,240 acre-feet in the Tulsa District. The Corps has 2,115,220 acre-feet in 30 projects while the Section 7 projects totaled 1,725,020 acre-feet in 11 projects. The following table is a project listing showing water supply storage, yield, amount contracted, number of contracts (existing and pending), and usage.

Table VI-6

WATER SUPPLY STORAGE

Corps of Engineers Projects

(October 1989)



| PROJECT | STORAGE ALLOCATED TO WATER SUPPLY AF | ESTIMATED YIELD MGD | AMOUNT CONTRACTED AF | NUMBER OF CONTRACTS EXISTING | NUMBER OF CONTRACTS PENDING | AMOUNT SUPPLIED AF FY 88 | AMOUNT SUPPLIED AF FY 89 |
|---|---|---|---|---|---|---|---|
| ARKANSAS RIVER BASIN | | | | | | | |
| ARCADIA | 23090 | 11 | 23090 | 1 | 0 | 2247 | 2361 |
| PEARSON-SKUBITZ BIG HILL | 25700 | 8.5 | 25700 | 1 | 0 | 582 | 559 |
| BIRCH | 7630 | 3 | 0 | 0 | 0 | 0 | 0 |
| CANTON | 38000 (1) | 10 | 0 | 0 | 0 | 3633 | 0 |
| COPAN | 7500 | 3 | 5000 | 1 | 0 | 90 | 84 |
| COUNCIL GROVE | 24400 | 6 | 24400 | 1 | 0 | 0 | 0 |
| EL DORADO | 142800 | 22.2 | 142800 | 1 | 0 | 8052 | 8377 |
| ELK CITY | 24300 | 10 | 24300 | 1 | 0 | 0 | 0 |
| EUFAULA | 56000 | 50 | 12215 | 18 | 1 | 1637 | 1539 |
| FORT GIBSON | 0 | 0 | 0 | 0 | 0 | 15758 | 15124 |
| FORT SUPPLY | 400 | 0.2 | 400 | 1 | 0 | 145 | 171 |
| HEYBURN | 2000 (2) | 1.7 | 2000 | 3 | 0 | 1816 | 1626 |
| HULAH | 19800 | 12.4 | 19800 | 4 | 0 | 6612 | 11230 |
| JOHN REDMOND | 34900 | 24.5 | 34900 | 1 | 0 | 11085 | 8910 |

Table VI-6

WATER SUPPLY STORAGE

Corps of Engineers Projects
(October 1989)



| PROJECT | STORAGE ALLOCATED TO WATER SUPPLY AF | ESTIMATED YIELD MGD | AMOUNT CONTRACTED AF | NUMBER OF CONTRACTS EXISTING | NUMBER OF CONTRACTS PENDING | AMOUNT SUPPLIED AF FY 88 | AMOUNT SUPPLIED AF FY 89 |
|---|---|---|---|---|---|---|---|
| KAW | 171200 | 167 | 90800 | 3 (3) | 0 | 6861 | 5862 |
| KEYSTONE | 20000 | 20 | 18000 | 1 | 0 | 5402 | 4788 |
| MARION | 38300 | 3 | 38300 | 1 | 0 | 762 | 774 |
| OOLOGAH | 342600 | 154 | 322835 | 8 | 1 | 54192 | 51830 |
| OPTIMA | 76200 | 0 (4) | 0 | 0 | 0 | 0 | 0 |
| SKIATOOK | 62900 | 14 | 17308 | 6 (3) | 0 | 0 | 0 |
| TENKILLER | 25400 | 26.63 (4) | 17260 | 8 | 4 | 4752 | 5445 |
| TORONTO | 400 | 0.1 | 400 | 2 | 0 | 90 | 85 |
| WISTER | 14000 | 20.03 | 13653 | 3 | 0 | 3685 | 2423 |
| RED RIVER BASIN | | | | | | | |
| BROKEN BOW | 152500 | 175 | 60 | 1 | 1 | 0 | 0 |
| HUGO | 47600 | 58 | 44890 | 3 | 0 | 5831 | 7850 |
| PAT MAYSE | 109600 | 55 | 109600 | 1 | 0 | 12488 | 12357 |
| PINE CREEK | 49400 | 84 | 28800 | 1 | 0 | 33788 | 33639 |
| SARDIS | 297200 | 140 | 297200 | 1 | 0 | 0 | 0 |
| TEXOMA (5) | 150000 | 150 | 114956 | 5 | 1 | 104 | 108 |
| WAURIKA | 151400 | 36.2 | 41800 | 1 | 0 | 5178 | 2089 |

Table VI-6

WATER SUPPLY STORAGE

Section 7 Projects
(October 1989



| PROJECT (6) | STORAGE ALLOCATED TO WATER SUPPLY AF | AMOUNT WITHDRAWN AF FY 88 | FY 89 |
|---|---|---|---|
| ARKANSAS RIVER BASIN | | | |
| CHENEY | 146980 | 29345 | 25206 |
| HUDSON | 0 | 0 | 0 |
| MEREDITH | 499700 | 63426 | 68448 |
| THUNDERBIRD | 105900 | 17378 | 15252 |
| RED RIVER BASIN | | | |
| ALTUS | 122900 | 71546 | 55621 |
| ARBUCKLE | 62570 | 6978 | 11337 |
| FORT COBB | 78350 | 11051 | 11179 |
| FOSS | 243670 | 1987 | 1790 |
| LAKE KEMP | 268000 | 77187 | 47527 |
| MOUNTAIN PARK | 88950 | 4794 | 4493 |
| MCGEE CREEK | 108000 | 8 | 58 |

(1) Based on 1977 sedimentation survey.
(2) Estimated storage to be available in year 2000.
(3) Total includes one contract for conduit only.

1

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1989

ALBUQUERQUE DISTRICT

| | GENERAL INVESTIGATIONS | | CONSTRUCTION GENERAL | | | | | CORPS | |
|---|---|---|---|---|---|---|---|---|---|
| | STUDIES | GEN. COV | PLAN AE&D | PROJ. CONST | O&M | MR&T | CORPS TOTAL | PER-CENT | PROGRAM SUPPORT |
| FUNDS (DOLLARS) | | | | | | | | | |
| GAGE CLASS - SW | 0 | 0 | 0 | 0 | 192,760 | 0 | 192,760 | 93 | 206,260 |
| - QW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| - SS | 5,030 | 0 | 0 | 0 | 0 | 0 | 5,030 | 100 | 5,030 |
| - OT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 5,030 | 0 | 0 | 0 | 192,760 | 0 | 197,790 | 94 | 211,290 |
| PERCENT | 2.5 | 0.0 | 0.0 | 0.0 | 97.5 | 0.0 | 100.0 | | |
| NUMBER OF EQUIVALENT GAGES FUNDED | | | | | | | | | |
| GAGE CLASS - SW | 0.0 | 0.0 | 0.0 | 0.0 | 38.8 | 0.0 | 38.8 | 95 | 41.0 |
| - QW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| - SS | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 100 | 1.0 |
| - OT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| TOTAL | 1.0 | 0.0 | 0.0 | 0.0 | 38.8 | 0.0 | 39.8 | 95 | 42.0 |

NUMBER OF GAGING STATIONS/SITES: 42

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 42
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1989

FORT WORTH DISTRICT

| | GENERAL INVESTIGATIONS | | CONSTRUCTION GENERAL | | | | CORPS | | |
|---|---|---|---|---|---|---|---|---|---|
| | STUDIES | GEN. COV | PLAN AE&D | PROJ. CONST | O&M | MR&T | CORPS TOTAL | PER-CENT | PROGRAM SUPPORT |
| **FUNDS (DOLLARS)** | | | | | | | | | |
| GAGE CLASS - SW | 0 | 0 | 0 | 15,990 | 646,940 | 0 | 662,930 | 94 | 703,910 |
| - QW | 0 | 0 | 0 | 17,770 | 230,820 | 0 | 248,590 | 89 | 280,190 |
| - SS | 5,030 | 0 | 0 | 0 | 0 | 0 | 5,030 | 100 | 5,030 |
| - OT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 5,030 | 0 | 0 | 33,760 | 877,760 | 0 | 916,550 | 93 | 989,130 |
| PERCENT | 0.5 | 0.0 | 0.0 | 3.7 | 95.8 | 0.0 | 100.0 | | |
| **NUMBER OF EQUIVALENT GAGES FUNDED** | | | | | | | | | |
| GAGE CLASS - SW | 0.0 | 0.0 | 0.0 | 5.0 | 124.9 | 0.0 | 129.8 | 90 | 145.0 |
| - QW | 0.0 | 0.0 | 0.0 | 2.3 | 26.4 | 0.0 | 28.8 | 90 | 32.0 |
| - SS | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 100 | 1.0 |
| - OT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| TOTAL | 1.0 | 0.0 | 0.0 | 7.3 | 151.3 | 0.0 | 159.6 | 90 | 178.0 |

NUMBER OF GAGING STATIONS/SITES: 115

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 12
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1989

GALVESTON DISTRICT

| | GENERAL INVESTIGATIONS | | CONSTRUCTION GENERAL | | | | CORPS | | |
|---|---|---|---|---|---|---|---|---|---|
| | STUDIES | GEN. COV | PLAN AE&D | PROJ. CONST | O&M | MR&T | CORPS TOTAL | PER-CENT | PROGRAM SUPPORT |
| FUNDS (DOLLARS) | | | | | | | | | |
| GAGE CLASS - SW | 4,370 | 0 | 0 | 23,370 | 800,960 | 0 | 828,700 | 92 | 896,040 |
| - GW | 0 | 0 | 0 | 17,770 | 230,820 | 0 | 248,590 | 89 | 280,190 |
| - SS | 5,030 | 0 | 0 | 0 | 0 | 0 | 5,030 | 100 | 5,030 |
| - OT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 9,400 | 0 | 0 | 41,140 | 1,031,780 | 0 | 1,082,320 | 92 | 1,181,260 |
| PERCENT | 0.9 | 0.0 | 0.0 | 3.8 | 95.3 | 0.0 | 100.0 | | |
| NUMBER OF EQUIVALENT GAGES FUNDED | | | | | | | | | |
| GAGE CLASS - SW | 0.6 | 0.0 | 0.0 | 6.0 | 151.5 | 0.0 | 158.0 | 89 | 178.0 |
| - GW | 0.0 | 0.0 | 0.0 | 2.3 | 26.4 | 0.0 | 28.8 | 90 | 32.0 |
| - SS | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 100 | 1.0 |
| - OT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| TOTAL | 1.6 | 0.0 | 0.0 | 8.3 | 177.9 | 0.0 | 187.8 | 89 | 211.0 |

NUMBER OF GAGING STATIONS/SITES: 33

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 17
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1989

LITTLE ROCK DISTRICT

| | GENERAL INVESTIGATIONS | | CONSTRUCTION GENERAL | | | | CORPS | | |
|---|---|---|---|---|---|---|---|---|---|
| | STUDIES | GEN. COV | PLAN AE&D | PROJ. CONST | O&M | MR&T | CORPS TOTAL | PER-CENT | PROGRAM SUPPORT |
| FUNDS (DOLLARS) | | | | | | | | | |
| GAGE CLASS - SW | 10,080 | 5,400 | 0 | 23,370 | 1,166,160 | 0 | 1,205,010 | 87 | 1,379,570 |
| - QW | 0 | 0 | 0 | 17,770 | 247,620 | 0 | 265,390 | 89 | 298,320 |
| - SS | 5,030 | 0 | 0 | 0 | 5,230 | 0 | 10,260 | 60 | 17,030 |
| - OT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 15,110 | 5,400 | 0 | 41,140 | 1,419,010 | 0 | 1,480,660 | 87 | 1,694,920 |
| PERCENT | 1.0 | 0.4 | 0.0 | 2.8 | 95.8 | 0.0 | 100.0 | | |
| NUMBER OF EQUIVALENT GAGES FUNDED | | | | | | | | | |
| GAGE CLASS - SW | 3.6 | 2.6 | 0.0 | 6.0 | 202.0 | 0.0 | 214.2 | 86 | 249.0 |
| - QW | 0.0 | 0.0 | 0.0 | 2.3 | 28.3 | 0.0 | 30.6 | 90 | 34.0 |
| - SS | 1.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 3.4 | 56 | 6.0 |
| - OT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| TOTAL | 4.6 | 2.6 | 0.0 | 8.3 | 232.7 | 0.0 | 248.2 | 86 | 289.0 |

NUMBER OF GAGING STATIONS/SITES: 73

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 12
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND



1

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1989

TULSA DISTRICT

| | GENERAL INVESTIGATIONS | | CONSTRUCTION GENERAL | | | | | CORPS | |
|---|---|---|---|---|---|---|---|---|---|
| | STUDIES | GEN. COV | PLAN AE&D | PROJ. CONST | O&M | MR&T | CORPS TOTAL | PER-CENT | PROGRAM SUPPORT |
| **FUNDS (DOLLARS)** | | | | | | | | | |
| GAGE CLASS - SW | 10,080 | 5,400 | 0 | 23,370 | 2,102,470 | 0 | 2,141,320 | 78 | 2,762,425 |
| - QW | 0 | 0 | 0 | 17,770 | 352,910 | 0 | 370,680 | 92 | 403,995 |
| - SS | 5,030 | 0 | 0 | 0 | 22,310 | 0 | 27,340 | 63 | 43,530 |
| - OT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 15,110 | 5,400 | 0 | 41,140 | 2,477,690 | 0 | 2,539,340 | 79 | 3,209,950 |
| PERCENT | 0.6 | 0.2 | 0.0 | 1.6 | 97.6 | 0.0 | 100.0 | | |
| **NUMBER OF EQUIVALENT GAGES FUNDED** | | | | | | | | | |
| GAGE CLASS - SW | 3.6 | 2.6 | 0.0 | 6.0 | 339.4 | 0.0 | 351.5 | 80 | 440.0 |
| - QW | 0.0 | 0.0 | 0.0 | 2.3 | 38.3 | 0.0 | 40.6 | 92 | 44.0 |
| - SS | 1.0 | 0.0 | 0.0 | 0.0 | 41.4 | 0.0 | 42.4 | 92 | 46.0 |
| - OT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| TOTAL | 4.6 | 2.6 | 0.0 | 8.3 | 419.0 | 0.0 | 434.5 | 82 | 530.0 |

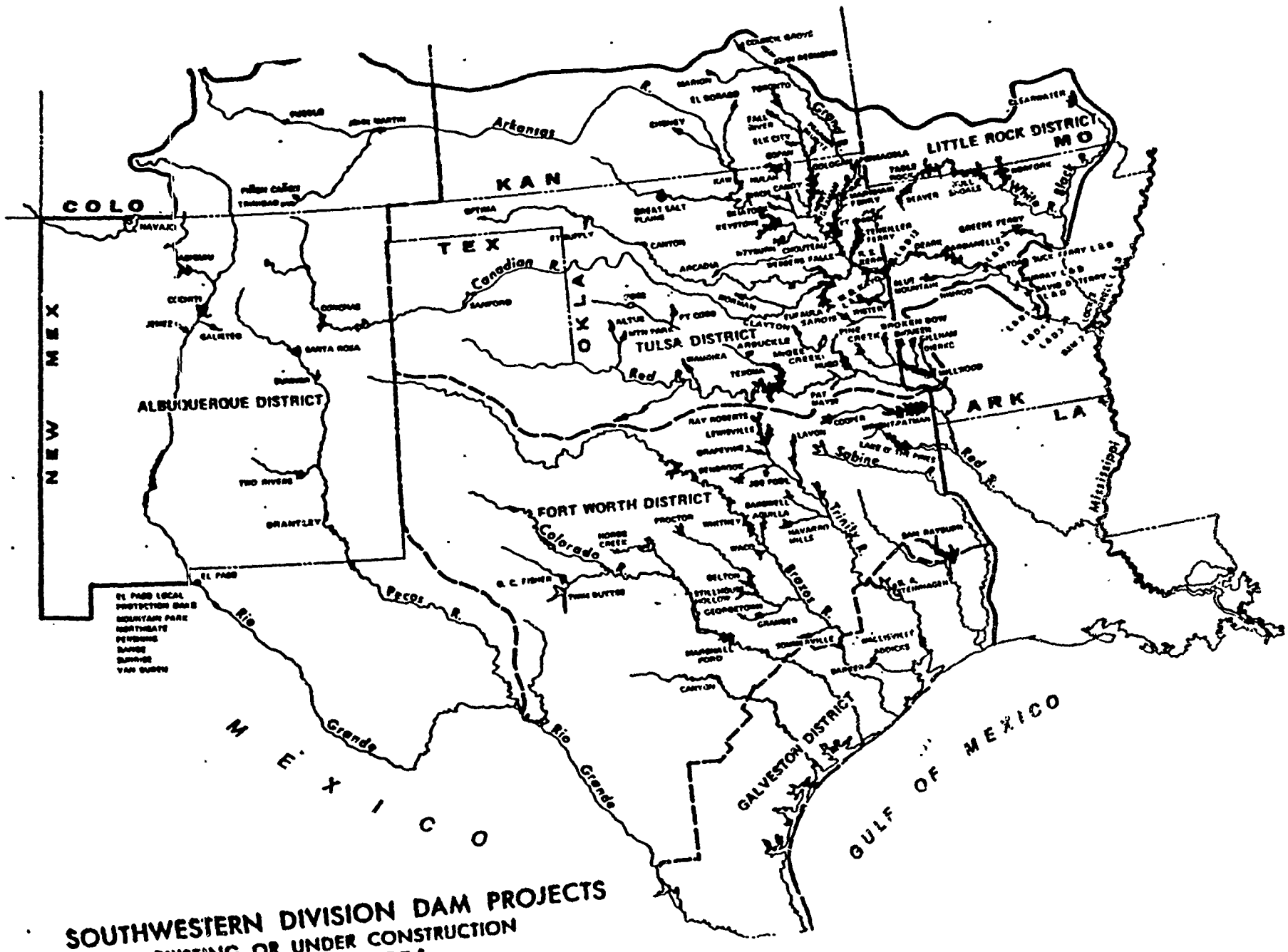
NUMBER OF GAGING STATIONS/SITES: 196

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 53
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

## SECTION VII - RESERVOIR DATA SUMMARY

1. SWD MAP
2. INDEX BY BASINS
3. INDEX IN ALPHABETICAL ORDER
4. DATA TABLES




SOUTHWESTERN DIVISION DAM PROJECTS
EXISTING OR UNDER CONSTRUCTION
December 1986

| LAKE NAME | STREAM | DIST | STATE | YR COMP | POOL ELEVATION CONS | POOL ELEVATION FC | CAPACITY**1 1000 AF CONS | CAPACITY**1 1000 AF FC | PAGE NO |
|---|---|---|---|---|---|---|---|---|---|
| | | | WHITE RIVER BASIN | | | | | | |
| BEAVER | WHITE | LRD | AR | 66 | 1120.00 | 1130.00 | 1652 | 300 | 1 |
| TABLE ROCK | WHITE | LRD | AR/MO | 58 | 915.00 | 931.00 | 2702 | 760 | 1 |
| BULL SHOALS | WHITE | LRD | AR/MO | 52 | 654.00 | 695.00 | 3048 | 2360 | 2 |
| NORFORK | NORTH FORK | LRD | AR/MO | 45 | 552.00 | 580.00 | 1251 | 732 | 2 |
| CLEARWATER | BLACK | LRD | MO | 48 | 494.00 | 567.00 | 22 | 391 | 3 |
| GREERS FERRY | LITTLE RED | LRD | AR | 62 | 461.00 | 487.00 | 1119 | 934 | 3 |
| | | | ARKANSAS RIVER BASIN | | | | | | |
| PUEBLO | ARKANSAS | AD* | CO | 74 | 4880.60 | 4898.70 | 264 | 93 | 4 |
| TRINIDAD | PURGATORIE R | AD | CO | 78 | 6226.40 | 6260.00 | 64 | 58 | 4 |
| JOHN MARTIN | ARKANSAS | AD | CO | 51 | 3851.00 | 3870.00 | 351 | 270 | 5 |
| CHENEY | N F NINNESCAH | TD* | KS | 64 | 1421.60 | 1429.00 | 167 | 81 | 5 |
| ELDORADO | WALNUT | TD | KS | 80 | 1339.00 | 1347.50 | 157 | 79 | 6 |
| KAW | ARKANSAS | TD | OK/KS | 76 | 1010.00 | 1044.50 | 429 | 919 | 6 |
| GREAT SALT PLAINS | SALT FORK ARK | TD | OK | 41 | 1125.00 | 1138.50 | 31 | 240 | 7 |
| KEYSTONE | ARKANSAS | TD | OK | 64 | 723.00 | 754.00 | 618 | 1219 | 7 |
| HEYBURN | POLECAT CR | TD | OK | 50 | 761.50 | 784.00 | 7 | 48 | 8 |
| TORONTO | VERDIGRIS R | TD | KS | 60 | 901.50 | 931.00 | 22 | 178 | 8 |
| FALL RIVER | FALL | TD | KS | 49 | 948.50 | 987.50 | 24 | 235 | 9 |
| ELK CITY | ELK | TD | KS | 66 | 792.00 | 825.00 | 34 | 256 | 9 |
| BIG HILL | BIG HILL CR | TD | KS | 81 | 858.00 | 867.50 | 27 | 13 | 10 |
| GOLOGAH | VERDIGRIS R | TD | OK | 63 | 638.00 | 661.00 | 553 | 966 | 10 |
| HULAH | CANEY | TD | OK/KS | 51 | 733.00 | 765.00 | 36 | 258 | 11 |
| COPAN | L CANEY | TD | OK/KS | 80 | 710.00 | 732.00 | 43 | 184 | 11 |
| BIRCH | BRICH CREEK | TD | OK | 79 | 750.50 | 774.00 | 19 | 39 | 12 |
| SKIATOOK | HOMINY CREEK | TD | OK | 82 | 714.00 | 729.00 | 305 | 182 | 12 |
| NEWT GRAHAM LD 18 | VERDIGRIS | TD | OK | 70 | 532.00 | .00 | 24 | 0 | 13 |
| CHOUTEAU LD 17 | VERDIGRIS | TD | OK | 70 | 511.00 | .00 | 23 | 0 | 13 |
| COUNCIL GROVE | NEOSHO R | TD | KS | 65 | 1270.00 | 1289.00 | 38 | 76 | 14 |
| MARION | COTTONWOOD R | TD | KS | 68 | 1350.50 | 1358.50 | 86 | 60 | 14 |
| JOHN REDMOND | NEOSHO R | TD | KS | 64 | 1039.00 | 1068.00 | 82 | 563 | 15 |
| GRAND LAKE (PENSACOLA) | NEOSHO (GRAND) | TD* | OK | 40 | 745.00 | 755.00 | 1672 | 525 | 15 |
| LAKE HUDSON | NEOSHO (GRAND) | TD* | OK | 64 | 619.00 | 636.00 | 200 | 244 | 16 |
| FORT GIBSON | NEOSHO (GRAND) | TD | OK | 52 | 544.00 | 582.00 | 365 | 919 | 16 |
| WEBBERS FALLS LD 16 | ARKANSAS | TD | OK | 70 | 490.00 | .00 | 165 | 0 | 17 |
| TENKILLER FERRY | ILLINOIS R | TD | OK | 52 | 632.00 | 667.00 | 654 | 577 | 17 |
| CONCHAS | CANADIAN R | AD | NM | 39 | 4201.00 | 4218.00 | 330 | 198 | 18 |
| MEREDITH (SANFORD) | CANADIAN R | TD* | TX | 65 | 2941.30 | 2965.00 | 945 | 463 | 18 |
| THUNDERBIRD (NORMAN) | LITTLE R | TD* | TX | 65 | 1039.00 | 1049.40 | 120 | 77 | 19 |
| OPTIMA | N CANADIAN R | TD | OK | 78 | 2763.50 | 2779.00 | 129 | 101 | 19 |
| FORT SUPPLY | WOLF CR | TD | OK | 42 | 2004.00 | 2028.00 | 14 | 87 | 20 |
| CANTON | N CANADIAN R | TD | OK | 48 | 1615.20 | 1638.00 | 116 | 268 | 20 |
| EUFAULA | CANADIAN R | TD | OK | 64 | 585.00 | 597.00 | 2329 | 1470 | 21 |
| R S KERR LD 15 | ARKANSAS | TD | OK | 70 | 460.00 | .00 | 494 | 0 | 21 |

| LAKE NAME | STREAM | DIST | STATE | YR COMP | POOL ELEVATION CONS | FC | CAPACITY** 1000 AF CONS | FC | PAGE NO |
|---|---|---|---|---|---|---|---|---|---|
| W D MAYO LD 14 | ARKANSAS | TD | OK | 70 | 413.00 | .00 | 16 | 0 | 22 |
| WISTER | POTEAU R | TD | OK | 49 | 471.60 | 502.50 | 27 | 400 | 22 |
| LD 13 | ARKANSAS | LRD | AR/OK | 69 | 392.00 | .00 | 54 | 0 | 23 |
| OZARK-J T LD 12 | ARKANSAS | LRD | AR | 69 | 372.00 | .00 | 148 | 0 | 23 |
| DARDANELLE LD 10 | ARKANSAS | LRD | AR | 64 | 338.00 | .00 | 486 | 0 | 24 |
| BLUE MOUNTAIN | PETIT JEAN | LRD | AR | 47 | 384.00 | 419.00 | 25 | 233 | 24 |
| LD 9 | ARKANSAS | LRD | AR | 69 | 287.00 | .00 | 65 | 0 | 25 |
| TOAD SUCK FERRY LD 8 | ARKANSAS | LRD | AR | 69 | 265.00 | .00 | 35 | 0 | 25 |
| NIMROD | FOURCHE LA FAVE | LRD | AR | 42 | 342.00 | 373.00 | 29 | 307 | 26 |
| MURRAY LD 7 | ARKANSAS | LRD | AR | 69 | 249.00 | .00 | 87 | 0 | 26 |
| DD TERRY LD 6 | ARKANSAS | LRD | AR | 68 | 231.00 | .00 | 50 | 0 | 27 |
| LD 5 | ARKANSAS | LRD | AR | 68 | 213.00 | .00 | 65 | 0 | 27 |
| LD 4 | ARKANSAS | LRD | AR | 68 | 196.00 | .00 | 70 | 0 | 28 |
| LD 3 | ARKANSAS | LRD | AR | 68 | 182.00 | .00 | 46 | 0 | 28 |
| LD 2 | ARKANSAS | LRD | AR | 67 | 162.00 | .00 | 110 | 0 | 29 |
| LD 1 | ARKANSAS | LRD | AR | 67 | 142.00 | .00 | 2 | 0 | 29 |
| | | | RED RIVER BASIN | | | | | | |
| ALTUS | N F RED | TD* | OK | 46 | 1559.00 | 1562.00 | 141 | 21 | 30 |
| TOM STEED (MTN. PARK) | W OTTER CREEK | TD* | OK | 75 | 1411.00 | 1414.00 | 96 | 20 | 30 |
| LAKE KEMP | WICHITA R | TD* | TX | 77 | 1144.00 | 1156.00 | 299 | 225 | 31 |
| WAURIKA | BEAVER CREEK | TD | OK | 78 | 951.40 | 962.50 | 203 | 140 | 31 |
| FOSS | WASHITA | TD* | OK | 61 | 1562.00 | 1668.60 | 256 | 181 | 32 |
| FORT COBB | COBB CREEK | TD* | OK | 59 | 1342.00 | 1354.80 | 78 | 64 | 32 |
| ARBUCKLE | ROCK CREEK | TD* | OK | 67 | 872.00 | 885.30 | 72 | 36 | 33 |
| LAKE TEXOMA | RED | TD | TX/OK | 45 | 617.30 | 640.00 | 2836 | 2660 | 33 |
| PAT MAYSE | SANDERS CREEK | TD | TX | 68 | 451.00 | 460.50 | 124 | 65 | 34 |
| SARDIS | JACK FORK CREEK | TD | OK | 84 | 599.00 | 607.00 | 302 | 128 | 34 |
| HUGO | KIAMICHI R | TD | OK | 74 | 404.50 | 437.50 | 157 | 809 | 35 |
| PINE CREEK | LITTLE R | TD | OK | 69 | 443.50 | 480.00 | 78 | 388 | 35 |
| BROKEN BOW | MOUNTAIN FORK | TD | OK | 69 | 599.50 | 627.50 | 919 | 450 | 36 |
| DEQUEEN | ROLLING FORK | LRD | AR | 77 | 437.00 | 473.50 | 35 | 101 | 37 |
| GILLHAM | COSSATOT | LRD | AR | 76 | 502.00 | 569.00 | 33 | 189 | 37 |
| DIERKS | SALINE R | LRD | AR | 76 | 526.00 | 557.50 | 30 | 67 | 38 |
| MILLWOOD | LITTLE R | LRD | AR | 66 | 259.20 | 287.00 | 207 | 1653 | 38 |
| WRIGHT PATMAN | SULPHER RIVR | FWD | TX | 56 | 220.00 | 259.50 | 143 | 2509 | 39 |
| LAKE O THE PINES | CYPRESS CREEK | FWD | TX | 60 | 228.50 | 249.50 | 251 | 580 | 39 |
| | | | NECHES RIVER BASIN | | | | | | |
| SAM RAYBURN | ANGELINA R | FWD | TX | 65 | 164.40 | 173.00 | 2898 | 1009 | 40 |
| B A STEINHAGEN | NECHES R | FWD | TX | 51 | 81.00 | 83.00 | 70 | 24 | 40 |
| | | | TRINITY RIVER BASIN | | | | | | |
| BENBROOK | CLEAR FORK | FWD | TX | 52 | 694.00 | 724.00 | 88 | 170 | 41 |
| LEWISVILLE | ELM FORK | FWD | TX | 54 | 515.00 | 532.00 | 463 | 525 | 41 |
| GRAPEVINE | DENTON CR | FWD | TX | 52 | 535.00 | 560.00 | 189 | 248 | 42 |

| LAKE NAME | STREAM | DIST | STATE | YR COMP | POOL ELEVATION CONS | POOL ELEVATION FC | CAPACITY** 1000 AF CONS | CAPACITY** 1000 AF FC | PAGE NO |
|---|---|---|---|---|---|---|---|---|---|
| LAVON | EAST FORK | FWD | TX | 77 | 492.00 | 503.50 | 457 | 277 | 42 |
| NAVARRO MILLS | RICHLAND CR | FWD | TX | 68 | 424.50 | 443.00 | 63 | 149 | 43 |
| BARDWELL | WAXAHACHIE CR | FWD | TX | 65 | 421.00 | 439.00 | 55 | 85 | 43 |
| | | | | SAN JACINTO RIVER BASIN | | | | | |
| BARKER | BUFFALO BAYOU | GD | TX | 45 | .00 | 107.00 | 0 | 207 | 44 |
| ADDICKS | BUFFALO BAYOU | GD | TX | 48 | .00 | 114.00 | 0 | 205 | 44 |
| | | | | BRAZOS RIVER BASIN | | | | | |
| WHITNEY | BRAZOS | FWD | TX | 51 | 533.00 | 571.00 | 627 | 1372 | 45 |
| AQUILLA | AQUILLA | FWD | TX | 83 | 537.50 | 556.00 | 34 | 87 | 45 |
| WACO | BOSQUE | FWD | TX | 65 | 455.00 | 500.00 | 153 | 574 | 46 |
| PROCTOR | LEON R | FWD | TX | 63 | 1162.00 | 1197.00 | 59 | 315 | 46 |
| BELTON | LEON R | FWD | TX | 54 | 594.00 | 631.00 | 458 | 640 | 47 |
| STILLHOUSE H | LAMPASAS R | FWD | TX | 68 | 622.00 | 666.00 | 236 | 395 | 47 |
| GEORGETOWN | N F SAN GABRIEL | FWD | TX | 79 | 791.00 | 834.00 | 37 | 93 | 48 |
| GRANGER | SAN GRBRIEL | FWD | TX | 79 | 504.00 | 524.00 | 66 | 179 | 48 |
| SOMERVILLE | YEGUA CR | FW | TX | 67 | 238.00 | 258.00 | 160 | 347 | 49 |
| | | | | COLORADO RIVER BASIN | | | | | |
| TWIN BUTTES | S&M CONCHO R | FWD* | TX | 63 | 1940.20 | 1969.10 | 186 | 454 | 50 |
| O C FISHER | N CONCHO R | FWD | TX | 52 | 1908.00 | 1938.50 | 119 | 277 | 51 |
| HORDS CR | HORDS CR | FWD | TX | 48 | 1900.00 | 1920.00 | 9 | 17 | 51 |
| MARSHALL FORD | COLORADO R | FWD* | TX | 40 | 681.00 | 714.00 | 1172 | 780 | 52 |
| | | | | GUADALUPE RIVER BASIN | | | | | |
| CANYON | GUADALUPE R | FWD | TX | 64 | 909.00 | 943.00 | 386 | 355 | 53 |
| | | | | RIO GRANDE BASIN | | | | | |
| PLATORO | CONEJOS R | AD* | CO | 51 | 10027.50 | 10034.00 | 54 | 6 | 54 |
| ABIQUIU | RIO CHAMA | AD | NM | 63 | .00 | 6283.50 | 0 | 568 | 54 |
| COCHITI | RIO GRANDE | AD | NM | 75 | 5321.45 | 5460.50 | 47 | 539 | 55 |
| GALISTEO | GALISTEO CR | AD | NM | 70 | .00 | 5608.00 | 0 | 90 | 55 |
| JEMEZ CANYON | JEMEZ R | AD | NM | 53 | 5160.00 | 5232.00 | 2 | 104 | 56 |
| SANTA ROSA | PECOS R | AD | NM | 80 | 4776.50 | 4797.00 | 267 | 182 | 56 |
| SUMNER | PECOS R | AD* | NM | 37 | 4261.00 | 4282.00 | 47 | 86 | 57 |
| TWO RIVERS | RIO HONDO | AD | NM | 63 | .00 | 4032.00 | 0 | 168 | 57 |
| BRANTLEY DAM | RIO GRANDE | AD | NM | 88 | 3271.00 | 3283.00 | 1495 | 3485 | 61 |

*Section 7 Flood Control Projects
**Includes dead storage, conservation, water supply, power, irrigation, etc.

SUMMARY OF LAKE CONDITIONS FOR WATER YEAR 1989
LITTLE ROCK DISTRICT
WHITE RIVER BASIN

| BEAVER | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1968 thru 1989 | 50.7 | 110.6 | 123.4 | 76.0 | 113.0 | 197.5 | 168.8 | 117.5 | 81.9 | 21.5 | 15.3 | 27.8 | 1104.0 |
| WY 1989 | 3.0 | 61.3 | 56.3 | 107.5 | 325.9 | 215.6 | 67.9 | 99.9 | 149.3 | 24.8 | 11.2 | 9.7 | 1132.4 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1968 thru 1989 | 33.6 | 50.8 | 88.7 | 85.4 | 95.4 | 105.8 | 123.0 | 99.7 | 84.1 | 82.0 | 77.5 | 51.6 | 977.6 |
| WY 1989 | 12.5 | 13.7 | 4.8 | 60.7 | 192.6 | 191.6 | 206.6 | 97.9 | 141.8 | 22.8 | 16.4 | 14.6 | 976.0 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1968 thru 1989 | 4.5 | 4.5 | 3.5 | 2.0 | 2.6 | 4.5 | 4.0 | 4.8 | 4.1 | 2.7 | 3.2 | 4.0 | 44.4 |
| WY 1989 | 1.7 | 6.6 | 2.6 | 2.7 | 6.5 | 4.6 | .4 | 5.9 | 6.2 | 3.5 | 2.7 | 3.5 | 46.9 |
| Deviation | -2.8 | 2.1 | -.9 | .7 | 3.9 | .1 | -3.6 | 1.1 | 2.1 | .8 | -.5 | -.5 | 2.5 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 1116.20 | 1117.77 | 1119.47 | 1120.96 | 1125.37 | 1125.94 | 1120.89 | 1120.59 | 1120.49 | 1120.15 | 1119.59 | 1119.17 | |
| Maximum | 1116.82 | 1117.77 | 1119.47 | 1121.24 | 1125.76 | 1125.94 | 1125.94 | 1121.26 | 1121.97 | 1120.49 | 1120.15 | 1119.59 | |
| Minimum | 1116.17 | 1115.80 | 1117.77 | 1119.47 | 1119.41 | 1124.82 | 1120.88 | 1120.59 | 1120.49 | 1119.95 | 1119.59 | 1119.17 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 1547.1 | 1589.8 | 1637.1 | 1679.4 | 1808.6 | 1825.7 | 1677.4 | 1668.8 | 1665.9 | 1656.2 | 1640.5 | 1628.7 | |

| TABLE ROCK LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1961 thru 1989 | 107.9 | 225.3 | 258.3 | 213.4 | 250.6 | 412.9 | 420.1 | 347.2 | 223.5 | 138.9 | 110.7 | 97.7 | 2806.5 |
| WY 1989 | 26.0 | 205.0 | 117.7 | 238.5 | 693.4 | 644.7 | 373.7 | 208.9 | 285.7 | 75.2 | 73.1 | 77.1 | 3019.0 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1961 thru 1989 | 107.6 | 179.8 | 273.7 | 245.2 | 221.5 | 318.3 | 353.4 | 315.1 | 206.2 | 204.6 | 166.4 | 117.1 | 2708.9 |
| WY 1989 | 79.0 | 74.8 | 97.0 | 106.9 | 408.4 | 581.7 | 444.2 | 205.1 | 230.9 | 154.6 | 153.2 | 90.8 | 2626.6 |
| Intervening Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1961 thru 1989 | 4.5 | 4.3 | 3.6 | 1.8 | 2.1 | 4.2 | 4.0 | 4.4 | 4.4 | 2.9 | 3.6 | 3.9 | 43.7 |
| WY 1989 | 2.0 | 6.3 | 2.9 | 2.5 | 5.1 | 5.0 | .3 | 4.2 | 5.4 | 4.3 | 3.3 | 3.7 | 45.0 |
| Deviation | -2.5 | 2.0 | -.7 | .7 | 3.0 | .8 | -3.7 | -.2 | 1.0 | 1.4 | -.3 | -.2 | 1.3 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 903.34 | 906.55 | 906.88 | 909.99 | 916.57 | 917.73 | 915.76 | 915.44 | 916.30 | 914.01 | 911.68 | 911.06 | |
| Maximum | 905.06 | 906.72 | 906.88 | 909.99 | 917.25 | 920.09 | 917.85 | 915.76 | 917.75 | 916.49 | 914.02 | 911.72 | |
| Minimum | 903.34 | 902.66 | 905.26 | 906.88 | 909.99 | 916.41 | 915.71 | 913.68 | 915.28 | 913.87 | 911.59 | 910.67 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 2234.9 | 2356.5 | 2369.3 | 2492.6 | 2770.1 | 2821.1 | 2734.7 | 2720.9 | 2758.2 | 2659.4 | 2561.9 | 2536.5 | |

## WHITE RIVER BASIN

| BULL SHOALS LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 142.8 | 275.3 | 385.8 | 304.8 | 346.5 | 535.6 | 562.1 | 546.9 | 338.3 | 359.6 | 199.9 | 155.6 | 4153.2 |
| WY 1989 | 104.3 | 313.1 | 214.8 | 256.6 | 860.0 | 871.4 | 565.9 | 288.3 | 402.4 | 199.5 | 181.9 | 117.4 | 4375.6 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 203.9 | 195.1 | 282.6 | 252.6 | 322.2 | 383.8 | 426.3 | 392.8 | 308.0 | 387.4 | 338.1 | 239.1 | 3731.9 |
| WY 1989 | 195.4 | 146.3 | 127.6 | 207.7 | 275.3 | 861.0 | 1053.4 | 287.3 | 240.3 | 271.7 | 216.6 | 66.6 | 3949.2 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 3.8 | 4.3 | 3.3 | 1.8 | 2.3 | 3.8 | 4.0 | 4.2 | 3.5 | 3.2 | 3.4 | 3.9 | 41.5 |
| WY 1989 | 2.1 | 6.8 | 2.4 | 2.2 | 5.7 | 5.9 | .3 | 4.8 | 5.9 | 3.3 | 2.4 | 2.8 | 44.6 |
| Deviation | -1.7 | 2.5 | -.9 | .4 | 3.4 | 2.1 | -3.7 | .6 | 2.4 | .1 | -1.0 | -1.1 | 3.1 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 646.05 | 649.65 | 651.34 | 652.14 | 664.17 | 664.02 | 653.37 | 652.88 | 655.95 | 653.81 | 652.52 | 653.27 | |
| Maximum | 649.01 | 649.65 | 651.34 | 652.14 | 664.17 | 667.78 | 665.19 | 653.40 | 657.33 | 656.11 | 654.21 | 653.46 | |
| Minimum | 646.05 | 644.65 | 649.65 | 649.61 | 652.14 | 663.64 | 653.28 | 651.42 | 652.88 | 653.60 | 652.52 | 652.52 | |
| Pool Content EOM (1,000 AC. FT.) | 2702.1 | 2855.0 | 2929.0 | 2964.3 | 3536.7 | 3529.0 | 3019.7 | 2997.6 | 3136.7 | 3039.5 | 2981.4 | 3015.2 | |

| NORFORK LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1946 thru 1989 | 51.9 | 100.6 | 126.2 | 119.5 | 138.0 | 186.4 | 196.6 | 186.2 | 106.0 | 75.3 | 48.2 | 46.2 | 1381.1 |
| WY 1989 | 41.9 | 198.4 | 106.6 | 126.1 | 408.3 | 203.6 | 148.0 | 177.3 | 138.5 | 72.9 | 46.9 | 40.3 | 1708.8 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1946 thru 1989 | 66.9 | 62.6 | 102.4 | 135.0 | 122.1 | 122.6 | 141.7 | 117.7 | 109.3 | 118.0 | 108.0 | 84.4 | 1290.7 |
| WY 1989 | 90.4 | 50.8 | 158.9 | 125.2 | 167.8 | 309.4 | 257.7 | 107.1 | 133.4 | 71.9 | 51.6 | 88.4 | 1612.6 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1946 thru 1989 | 3.1 | 3.9 | 3.2 | 2.4 | 2.8 | 3.7 | 4.0 | 4.9 | 4.0 | 3.5 | 3.0 | 3.5 | 42.0 |
| WY 1989 | 2.6 | 6.8 | 2.3 | 2.3 | 6.2 | 3.3 | .7 | 5.5 | 4.5 | 3.6 | 1.9 | 2.9 | 42.6 |
| Deviation | -.5 | 2.9 | -.9 | -.1 | 3.4 | -.4 | -3.3 | .6 | .5 | .1 | -1.1 | -.6 | .6 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 548.07 | 554.59 | 552.02 | 551.82 | 561.92 | 557.23 | 551.99 | 554.69 | 554.48 | 554.04 | 553.38 | 550.88 | |
| Maximum | 550.98 | 554.65 | 554.66 | 552.18 | 561.95 | 562.13 | 557.23 | 555.97 | 555.37 | 554.52 | 554.05 | 553.42 | |
| Minimum | 548.07 | 547.35 | 551.55 | 551.41 | 551.78 | 556.72 | 551.99 | 551.94 | 553.55 | 553.80 | 553.37 | 550.88 | |
| Pool Content EOM (1,000 AC. FT.) | 1166.9 | 1309.0 | 1251.6 | 1247.2 | 1482.9 | 1369.8 | 1251.0 | 1311.2 | 1306.5 | 1296.6 | 1281.8 | 1226.6 | |

## WHITE RIVER BASIN

| CLEARWATER LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1949 thru 1989 | 22.7 | 50.9 | 64.3 | 55.7 | 58.9 | 90.0 | 93.0 | 73.9 | 39.4 | 26.2 | 19.1 | 20.4 | 614.5 |
| WY 1989 | 20.3 | 62.8 | 40.8 | 51.3 | 127.0 | 68.1 | 74.0 | 21.4 | 71.7 | 16.8 | 14.0 | 13.8 | 582.0 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1949 thru 1989 | 23.4 | 33.4 | 59.7 | 61.4 | 60.4 | 78.8 | 88.2 | 73.4 | 50.8 | 32.9 | 27.1 | 26.7 | 616.2 |
| WY 1989 | 21.4 | 52.4 | 45.4 | 55.8 | 110.5 | 76.9 | 79.4 | 16.3 | 71.4 | 15.6 | 16.5 | 15.9 | 577.5 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1949 thru 1989 | 3.0 | 4.1 | 3.5 | 2.5 | 2.8 | 4.1 | 4.3 | 4.5 | 3.8 | 3.7 | 3.4 | 3.4 | 43.1 |
| WY 1989 | 3.8 | 6.2 | 2.6 | 2.8 | 6.0 | 4.0 | 2.4 | 2.7 | 6.3 | 3.9 | 3.4 | 1.8 | 45.9 |
| Deviation | .8 | 2.1 | -.9 | .3 | 3.2 | -.1 | -1.9 | -1.8 | 2.5 | .2 | .0 | -1.6 | 2.8 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 494.05 | 499.73 | 497.24 | 494.54 | 503.00 | 498.60 | 495.37 | 497.97 | 497.77 | 498.06 | 496.38 | 494.97 | |
| Maximum | 495.76 | 504.11 | 499.73 | 497.24 | 514.46 | 503.00 | 505.08 | 498.36 | 509.02 | 498.31 | 498.22 | 496.73 | |
| Minimum | 493.88 | 494.02 | 493.93 | 493.96 | 494.34 | 494.01 | 493.86 | 495.37 | 497.41 | 497.03 | 496.38 | 494.63 | |
| Pool Content EOM (1,000 AC. FT.) | 22.0 | 32.2 | 27.5 | 22.8 | 39.1 | 30.0 | 24.2 | 28.8 | 28.5 | 29.0 | 25.9 | 23.5 | |

| GREERS FERRY LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1965 thru 1989 | 44.4 | 117.6 | 188.2 | 111.4 | 153.7 | 144.3 | 218.8 | 158.6 | 52.8 | 11.2 | 7.6 | 25.0 | 1233.6 |
| WY 1989 | 7.8 | 303.9 | 85.0 | 182.8 | 530.2 | 234.8 | 88.4 | 125.0 | 40.2 | 21.0 | 1.8 | 1.9 | 1622.8 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1965 thru 1989 | 35.7 | 40.1 | 78.6 | 145.5 | 138.4 | 141.7 | 144.3 | 127.3 | 89.0 | 100.8 | 98.5 | 52.0 | 1191.9 |
| WY 1989 | 13.5 | 20.3 | 82.0 | 162.8 | 182.6 | 240.9 | 342.0 | 149.0 | 66.2 | 26.2 | 19.2 | 16.4 | 1321.1 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 4.1 | 4.9 | 5.6 | 2.7 | 3.3 | 4.9 | 4.7 | 5.1 | 3.6 | 3.4 | 3.2 | 4.8 | 50.3 |
| WY 1989 | 4.2 | 10.7 | 2.9 | 4.0 | 9.0 | 5.2 | 1.7 | 6.2 | 4.4 | 4.8 | 1.1 | 3.3 | 57.5 |
| Deviation | .1 | 5.8 | -2.7 | 1.3 | 5.7 | .3 | -3.0 | 1.1 | .8 | 1.4 | -2.1 | -1.5 | 7.2 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 452.49 | 461.68 | 461.64 | 462.13 | 472.36 | 471.98 | 464.19 | 463.09 | 461.93 | 461.37 | 460.46 | 459.77 | |
| Maximum | 453.11 | 461.68 | 461.76 | 462.40 | 472.51 | 473.12 | 472.42 | 464.58 | 463.09 | 461.95 | 461.38 | 460.55 | |
| Minimum | 452.46 | 452.30 | 460.71 | 460.63 | 460.87 | 470.65 | 464.19 | 463.09 | 461.93 | 461.37 | 460.46 | 459.74 | |
| Pool Content EOM (1,000 AC. FT.) | 1653.2 | 1931.9 | 1930.7 | 1946.2 | 2289.8 | 2276.3 | 2012.2 | 1976.9 | 1939.8 | 1922.2 | 1893.5 | 1871.9 | |

PUEBLO RESERVOIR

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1894 thru 1989 | 22.11 | 22.49 | 21.35 | 19.96 | 16.81 | 16.46 | 24.29 | 68.28 | 127.73 | 87.11 | 55.91 | 25.88 | 508.40 |
| FY 1989 | 20.23 | 22.70 | 21.01 | 23.49 | 22.91 | 44.93 | 41.72 | 46.21 | 75.31 | 73.16 | 57.58 | 17.67 | 466.92 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 20.43 | 16.20 | 13.93 | 14.26 | 13.62 | 15.72 | 28.06 | 65.38 | 123.04 | 90.35 | 57.27 | 24.80 | 483.07 |
| FY 1989 | 20.76 | 12.83 | 7.14 | 7.25 | 17.04 | 34.69 | 48.42 | 48.35 | 80.18 | 118.10 | 76.80 | 19.89 | 491.45 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1938 thru 1989 | .58 | .34 | .46 | .31 | .29 | .96 | .89 | 1.71 | 1.49 | 1.71 | 1.93 | .73 | 11.39 |
| FY 1989 | .0 | .14 | .19 | .02 | .56 | .06 | .50 | .26 | .31 | 1.31 | .93 | 1.05 | 5.33 |
| Pool Elevation (EOM) | 4850.78 | 4853.68 | 4857.64 | 4862.05 | 4863.61 | 4866.10 | 4863.93 | 4862.82 | 4860.97 | 4846.95 | 4839.78 | 4838.55 | |
| Maximum | 4851.21 | 4853.68 | 4857.64 | 4862.05 | 4863.61 | 4866.10 | 4866.14 | 4864.06 | 4862.79 | 4860.68 | 4846.58 | 4839.62 | |
| Minimum | 4850.75 | 4850.77 | 4853.86 | 4857.78 | 4862.14 | 4863.65 | 4863.85 | 4862.73 | 4860.97 | 4846.95 | 4839.78 | 4838.55 | |
| Pool Content (EOM) (1000 Ac-Ft) | 149.32 | 158.70 | 172.12 | 187.92 | 193.74 | 203.27 | 194.95 | 190.78 | 183.97 | 137.50 | 116.87 | 113.49 | |

TRINIDAD LAKE

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1896 thru 1989 | 2.37 | 1.70 | 1.50 | 1.29 | 1.23 | 1.60 | 4.26 | 10.86 | 13.08 | 10.06 | 8.40 | 3.69 | 56.89 |
| FY 1989 | 2.24 | 1.51 | 1.20 | 1.08 | 1.54 | 1.60 | 2.02 | 3.38 | 3.26 | 2.44 | 2.46 | 1.99 | 24.72 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1978 thru 1989 | 1.59 | .47 | .23 | .18 | .21 | .20 | 2.11 | 10.01 | 13.11 | 12.15 | 9.96 | 8.66 | 58.89 |
| FY 1989 | .0 | .41 | .04 | .15 | .0 | .19 | 3.87 | 14.46 | 3.66 | 6.82 | 3.57 | 1.36 | 34.54 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1978 thru 1989 | .96 | 1.00 | .67 | .52 | .71 | 1.12 | 1.35 | 2.91 | 2.34 | 2.24 | 3.33 | 1.50 | 18.65 |
| FY 1989 | .74 | 1.09 | .52 | .43 | 1.47 | .16 | .99 | 1.63 | 2.42 | 2.17 | 3.13 | 2.42 | 17.17 |
| Pool Elevation (EOM) | 6176.89 | 6178.34 | 6179.97 | 6181.32 | 6183.46 | 6185.11 | 6182.15 | 6162.28 | 6160.88 | 6149.52 | 6145.77 | 6147.35 | |
| Maximum | 6176.89 | 6178.34 | 6179.97 | 6181.32 | 6183.46 | 6185.11 | 6185.91 | 6181.55 | 6163.38 | 6160.43 | 6149.10 | 6147.35 | |
| Minimum | 6173.73 | 6176.53 | 6178.44 | 6180.02 | 6181.39 | 6183.55 | 6182.15 | 6162.28 | 6160.88 | 6149.52 | 6145.77 | 6145.25 | |
| Pool Content (EOM) (1000 Ac-Ft) | 19.69 | 20.63 | 21.72 | 22.66 | 24.20 | 25.43 | 23.25 | 11.85 | 11.23 | 6.51 | 5.24 | 5.75 | |

JOHN MARTIN RESERVOIR

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1914 thru 1989 | 8.81 | 6.87 | 7.53 | 9.02 | 8.04 | 6.74 | 13.97 | 32.39 | 51.49 | 33.04 | 32.54 | 9.70 | 222.14 |
| FY 1989 | 8.57 | 9.53 | 11.39 | 11.86 | 10.82 | 10.81 | 6.83 | 15.24 | 9.75 | 19.64 | 18.64 | 4.37 | 137.45 |
| Release (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1956 thru 1989 | 11.06 | 1.49 | .85 | .36 | .90 | 2.09 | 25.26 | 27.90 | 33.35 | 38.62 | 34.83 | 18.72 | 195.41 |
| FY 1989 | 9.93 | .32 | .16 | .16 | .16 | 4.11 | 32.48 | 23.13 | 13.11 | 41.79 | 31.82 | 5.68 | 162.84 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1943 thru 1989 | .75 | .40 | .24 | .22 | .25 | .58 | .98 | 2.12 | 1.53 | 1.94 | 1.84 | .94 | 11.81 |
| FY 1989 | .02 | .0 | .10 | .18 | .09 | .32 | .03 | 2.89 | 1.96 | 1.40 | 3.78 | 2.64 | 13.41 |
| Pool Elevation (EOM) | 3817.88 | 3819.66 | 3821.79 | 3823.92 | 3825.70 | 3826.42 | 3821.27 | 3819.07 | 3817.75 | 3811.38 | 3806.96 | 3806.06 | |
| Maximum | 3818.45 | 3819.66 | 3821.79 | 3823.92 | 3825.70 | 3826.42 | 3826.33 | 3821.14 | 3819.03 | 3817.69 | 3811.05 | 3806.93 | |
| Minimum | 3817.88 | 3817.95 | 3819.74 | 3821.85 | 3823.96 | 3825.77 | 3822.11 | 3817.69 | 3817.75 | 3811.38 | 3806.96 | 3806.06 | |
| Pool Content (EOM) (1000 Ac-Ft) | 78.99 | 87.22 | 97.84 | 109.37 | 119.86 | 124.29 | 95.17 | 84.43 | 78.41 | 52.63 | 37.41 | 34.58 | |





| CHENEY RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1938 THRU 1981 | 11.66 | 7.53 | 6.44 | 6.63 | 8.27 | 13.31 | 14.69 | 18.68 | 17.71 | 9.29 | 5.22 | 9.33 | 128.8 |
| FY 1989 | 1.09 | 2.24 | 0.82 | 1.72 | 3.21 | 6.68 | 3.22 | 18.20 | 38.86 | 18.72 | 12.33 | 15.53 | 122.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 8.87 | 11.87 | 3.45 | 3.90 | 4.42 | 10.15 | 15.56 | 13.39 | 12.28 | 9.83 | 1.68 | 3.05 | 98.4 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 19.70 | 22.46 | 0.00 | 16.93 | 59.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.18 | 1.30 | 0.91 | 0.69 | 0.93 | 1.65 | 2.43 | 4.03 | 4.02 | 3.09 | 2.95 | 3.00 | 27.18 |
| FY 1989 | 0.62 | 0.46 | 0.42 | 1.13 | 0.43 | 13.69 | 0.88 | 5.71 | 7.65 | 2.20 | 7.50 | 2.45 | 43.14 |
| DEVIATION | -1.56 | -0.84 | -0.49 | 0.44 | -0.50 | 12.04 | -1.55 | 1.68 | 3.63 | -0.89 | 4.55 | -0.55 | 15.96 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1419.60 | 1419.49 | 1419.50 | 1419.72 | 1419.85 | 1420.17 | 1419.97 | 1421.19 | 1422.68 | 1421.44 | 1422.02 | 1421.57 | |
| MAXIMUM | 1420.00 | 1419.61 | 1419.56 | 1419.72 | 1419.85 | 1420.24 | 1420.21 | 1421.19 | 1423.29 | 1423.37 | 1422.02 | 1422.97 | |
| MINIMUM | 1419.60 | 1419.41 | 1419.45 | 1419.50 | 1419.63 | 1419.82 | 1419.96 | 1419.76 | 1421.19 | 1421.44 | 1421.13 | 1421.55 | |
| POOL CONTENT-EOM (1000AC.FT) | 148.70 | 147.73 | 147.82 | 149.76 | 150.90 | 153.78 | 151.96 | 163.18 | 177.58 | 165.55 | 171.07 | 166.79 | |

ARKANSAS RIVER BASIN

| ELDORADO | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1921 THRU 1978 | 5.00 | 4.40 | 2.80 | 2.70 | 2.80 | 6.20 | 10.20 | 11.80 | 14.40 | 7.40 | 3.40 | 5.50 | 76.6 |
| FY 1989 | 0.25 | 0.46 | 0.21 | 0.54 | 0.54 | 1.53 | 0.21 | 3.30 | 7.85 | 0.68 | 26.00 | 19.94 | 61.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1983 THRU 1989 | 13.77 | 2.95 | 5.75 | 2.21 | 1.90 | 5.33 | 10.41 | 7.40 | 5.87 | 2.42 | 1.14 | 1.37 | 60.5 |
| FY 1989 | 0.43 | 0.30 | 0.31 | 0.31 | 0.28 | 0.31 | 0.42 | 0.43 | 0.76 | 0.74 | 0.74 | 5.35 | 10.4 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.49 | 1.67 | 1.14 | 0.89 | 0.97 | 1.96 | 2.91 | 4.34 | 4.84 | 3.65 | 3.18 | 3.80 | 31.84 |
| FY 1989 | 0.91 | 0.64 | 0.87 | 0.87 | 0.41 | 2.67 | 0.16 | 4.31 | 6.92 | 3.47 | 10.77 | 4.38 | 36.38 |
| DEVIATION | -1.58 | -1.03 | -0.27 | -0.02 | -0.56 | 0.71 | -2.75 | -0.03 | 2.08 | -0.18 | 7.59 | 0.58 | 4.54 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1336.71 | 1336.32 | 1336.11 | 1335.95 | 1335.79 | 1335.73 | 1335.29 | 1335.04 | 1335.60 | 1334.98 | 1338.03 | 1339.45 | |
| MAXIMUM | 1337.23 | 1336.71 | 1336.32 | 1336.11 | 1335.97 | 1335.79 | 1335.73 | 1335.29 | 1335.79 | 1335.60 | 1338.03 | 1340.08 | |
| MINIMUM | 1336.71 | 1336.32 | 1336.11 | 1335.92 | 1335.79 | 1335.57 | 1335.29 | 1334.96 | 1335.04 | 1334.98 | 1334.68 | 1338.03 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 139.43 | 136.57 | 135.03 | 133.88 | 132.75 | 132.32 | 129.22 | 127.45 | 131.40 | 127.04 | 149.37 | 160.66 | |



ARKANSAS RIVER BASIN

| KAW LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 158.53 | 125.65 | 84.51 | 85.12 | 96.99 | 171.76 | 249.25 | 301.29 | 342.30 | 239.71 | 131.96 | 141.41 | 2128.5 |
| FY 1989 | 21.92 | 31.64 | 28.56 | 34.12 | 27.97 | 47.80 | 43.74 | 125.95 | 381.72 | 163.64 | 209.65 | 736.26 | 1853.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1977 THRU 1989 | 187.19 | 144.12 | 97.22 | 116.30 | 99.40 | 262.22 | 330.93 | 232.01 | 324.76 | 242.75 | 87.14 | 140.26 | 2264.3 |
| FY 1989 | 20.72 | 20.10 | 26.84 | 75.21 | 28.93 | 9.72 | 33.05 | 60.74 | 320.32 | 284.83 | 150.69 | 690.43 | 1721.6 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.39 | 1.66 | 1.13 | 0.87 | 1.03 | 1.88 | 2.86 | 4.29 | 4.44 | 3.50 | 3.17 | 3.58 | 30.80 |
| FY 1989 | 0.96 | 0.83 | 0.47 | 1.06 | 0.47 | 5.11 | 0.50 | 4.47 | 7.28 | 2.92 | 7.45 | 5.03 | 36.55 |
| DEVIATION | -1.43 | -0.83 | -0.66 | 0.19 | -0.56 | 3.23 | -2.36 | 0.18 | 2.84 | -0.58 | 4.28 | 1.45 | 5.75 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1009.87 | 1010.30 | 1010.27 | 1007.69 | 1007.56 | 1009.68 | 1009.82 | 1013.01 | 1015.73 | 1008.55 | 1011.54 | 1013.64 | |
| MAXIMUM | 1010.43 | 1010.52 | 1010.30 | 1010.37 | 1007.80 | 1009.68 | 1010.21 | 1013.82 | 1021.03 | 1016.25 | 1011.54 | 1019.57 | |
| MINIMUM | 1009.86 | 1009.86 | 1009.82 | 1007.68 | 1007.11 | 1007.53 | 1009.68 | 1009.76 | 1011.67 | 1008.54 | 1008.44 | 1009.99 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 426.42 | 433.79 | 433.27 | 390.60 | 388.53 | 423.22 | 425.58 | 482.19 | 534.45 | 404.46 | 455.51 | 493.97 | |

ARKANSAS RIVER BASIN

| GREAT SALT PLAINS LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 21.23 | 15.25 | 9.13 | 9.23 | 13.13 | 21.07 | 31.69 | 54.65 | 45.26 | 22.56 | 21.24 | 19.10 | 283.5 |
| FY 1989 | 6.45 | 7.80 | 9.26 | 12.14 | 11.18 | 25.69 | 30.08 | 57.94 | 105.72 | 35.61 | 80.13 | 57.97 | 439.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 25.85 | 20.98 | 10.94 | 11.09 | 14.45 | 36.78 | 40.63 | 55.96 | 58.65 | 24.40 | 10.09 | 15.10 | 324.9 |
| FY 1989 | 1.54 | 2.16 | 7.49 | 10.39 | 10.23 | 14.27 | 35.81 | 48.71 | 99.01 | 37.30 | 68.34 | 65.34 | 400.6 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.87 | 1.19 | 0.84 | 0.69 | 0.91 | 1.52 | 2.35 | 3.71 | 3.57 | 2.54 | 2.89 | 2.39 | 24.47 |
| FY 1989 | 2.06 | 0.16 | 0.21 | 0.64 | 0.67 | 3.29 | 0.68 | 5.18 | 8.18 | 3.41 | 9.37 | 3.33 | 37.18 |
| DEVIATION | 0.19 | -1.03 | -0.63 | -0.05 | -0.24 | 1.77 | -1.67 | 1.47 | 4.61 | 0.87 | 6.48 | 0.94 | 12.71 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1124.79 | 1125.26 | 1125.25 | 1125.40 | 1125.35 | 1126.32 | 1125.24 | 1125.80 | 1126.10 | 1125.63 | 1126.44 | 1125.54 | |
| MAXIMUM | 1124.90 | 1125.41 | 1125.54 | 1125.49 | 1125.51 | 1126.32 | 1126.68 | 1127.01 | 1128.34 | 1126.10 | 1127.38 | 1126.61 | |
| MINIMUM | 1124.40 | 1124.76 | 1125.11 | 1125.21 | 1125.24 | 1125.17 | 1125.13 | 1125.10 | 1125.68 | 1125.43 | 1125.30 | 1125.54 | |
| POOL CONTENT-EOM (1000AC.FT) | 29.71 | 33.83 | 33.74 | 35.13 | 34.67 | 44.05 | 33.65 | 38.84 | 41.75 | 37.27 | 45.31 | 36.43 | |

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ARKANSAS RIVER BASIN

| KEYSTONE LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 394.68 | 288.16 | 175.45 | 167.90 | 194.73 | 336.81 | 536.34 | 752.88 | 738.79 | 466.47 | 283.50 | 328.51 | 4664.2 |
| FY 1989 | 82.61 | 122.38 | 90.25 | 131.30 | 119.40 | 278.28 | 206.28 | 307.64 | 987.37 | 516.10 | 564.89 | 1309.09 | 4715.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 516.30 | 290.52 | 212.25 | 218.82 | 218.33 | 559.76 | 654.70 | 644.43 | 727.50 | 472.13 | 210.05 | 274.47 | 4999.3 |
| FY 1989 | 102.49 | 69.74 | 99.02 | 98.77 | 107.09 | 210.67 | 295.24 | 239.32 | 904.88 | 582.37 | 558.58 | 1256.94 | 4525.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.82 | 2.56 | 2.56 | 0.97 | 1.15 | 1.87 | 2.87 | 4.41 | 4.16 | 3.14 | 2.99 | 3.40 | 33.90 |
| FY 1989 | 1.96 | 1.37 | 1.06 | 1.33 | 1.15 | 3.04 | 0.43 | 4.62 | 8.05 | 3.87 | 7.46 | 4.21 | 38.55 |
| DEVIATION | -1.86 | -1.19 | -1.50 | 0.36 | 0.00 | 1.17 | -2.44 | 0.21 | 3.89 | 0.73 | 4.47 | 0.81 | 4.65 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 720.92 | 722.87 | 722.36 | 723.65 | 724.08 | 726.52 | 722.54 | 724.91 | 727.55 | 724.56 | 724.35 | 726.05 | |
| MAXIMUM | 722.96 | 723.08 | 723.14 | 723.83 | 724.08 | 726.85 | 726.52 | 725.63 | 732.77 | 727.61 | 727.05 | 732.66 | |
| MINIMUM | 720.79 | 720.92 | 722.15 | 721.89 | 722.31 | 722.10 | 722.13 | 722.45 | 724.75 | 724.56 | 723.64 | 724.33 | |
| POOL CONTENT-EOM (1000AC.FT) | 510.32 | 554.59 | 542.77 | 573.25 | 583.68 | 646.67 | 546.94 | 604.43 | 674.86 | 595.68 | 590.43 | 634.00 | |

ARKANSAS RIVER BASIN

| HEYBURN LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1929 THRU 1981 | 2.44 | 2.65 | 1.50 | 1.30 | 1.93 | 3.24 | 6.15 | 7.82 | 7.59 | 2.51 | 1.53 | 3.77 | 42.4 |
| FY 1989 | 0.30 | 4.25 | 0.92 | 3.81 | 4.43 | 7.44 | 0.84 | 5.27 | 2.37 | 0.35 | 0.67 | 2.16 | 32.8 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 3.56 | 2.68 | 2.85 | 2.49 | 4.73 | 7.69 | 5.30 | 9.61 | 5.31 | 0.65 | 0.06 | 0.69 | 45.6 |
| FY 1989 | 0.39 | 3.66 | 1.25 | 4.94 | 5.02 | 6.83 | 1.80 | 4.26 | 2.04 | 0.23 | 0.24 | 2.44 | 33.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.84 | 2.27 | 1.49 | 1.43 | 1.54 | 2.33 | 3.51 | 4.95 | 4.32 | 3.12 | 2.98 | 3.99 | 34.77 |
| FY 1989 | 1.60 | 4.20 | 1.20 | 2.27 | 2.20 | 7.84 | 0.26 | 4.22 | 5.18 | 2.04 | 2.97 | 3.87 | 37.85 |
| DEVIATION | -1.24 | 1.93 | -0.29 | 0.84 | 0.66 | 5.51 | -3.25 | -0.73 | 0.86 | -1.08 | -0.01 | -0.12 | 3.08 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 761.44 | 761.98 | 761.96 | 762.52 | 762.03 | 762.69 | 761.64 | 761.82 | 761.71 | 761.34 | 761.37 | 760.57 | |
| MAXIMUM | 761.85 | 763.03 | 762.09 | 763.65 | 763.37 | 763.59 | 762.69 | 763.12 | 762.42 | 761.81 | 761.80 | 762.59 | |
| MINIMUM | 761.44 | 761.30 | 761.71 | 761.72 | 761.73 | 761.80 | 761.64 | 761.62 | 761.71 | 761.34 | 761.23 | 760.57 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 7.06 | 7.53 | 7.52 | 8.05 | 7.58 | 8.22 | 7.24 | 7.39 | 7.30 | 6.97 | 7.00 | 6.33 | |



ARKANSAS RIVER BASIN

| TORONTO LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 19.64 | 18.97 | 11.46 | 12.33 | 13.35 | 32.04 | 46.42 | 40.55 | 52.97 | 34.79 | 9.13 | 23.24 | 314.9 |
| FY 1989 | 0.10 | 0.11 | 0.47 | 0.44 | 0.47 | 6.15 | 0.79 | 44.47 | 40.76 | 1.86 | 91.32 | 81.92 | 268.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 29.38 | 21.79 | 16.93 | 9.39 | 20.55 | 42.75 | 54.12 | 34.48 | 54.45 | 15.77 | 12.93 | 16.84 | 329.4 |
| FY 1989 | 0.23 | 0.18 | 0.18 | 0.18 | 0.17 | 0.36 | 2.30 | 40.94 | 40.94 | 0.31 | 49.69 | 121.75 | 257.2 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.71 | 2.05 | 1.31 | 1.05 | 1.05 | 2.42 | 3.23 | 4.63 | 5.05 | 3.88 | 3.36 | 4.28 | 35.02 |
| FY 1989 | 1.49 | 1.01 | 1.63 | 1.52 | 0.64 | 4.10 | 0.21 | 5.51 | 5.93 | 5.61 | 9.68 | 4.65 | 41.98 |
| DEVIATION | -1.22 | -1.04 | 0.32 | 0.47 | -0.41 | 1.68 | -3.02 | 0.88 | 0.88 | 1.73 | 6.32 | 0.37 | 6.96 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 900.48 | 900.27 | 900.25 | 900.03 | 900.39 | 902.41 | 901.43 | 902.35 | 901.70 | 901.87 | 912.51 | 901.76 | |
| MAXIMUM | 900.90 | 900.50 | 900.39 | 900.35 | 900.40 | 902.43 | 902.41 | 911.00 | 906.69 | 901.87 | 913.31 | 912.51 | |
| MINIMUM | 900.48 | 900.21 | 900.22 | 900.03 | 900.02 | 900.19 | 901.41 | 901.20 | 901.68 | 901.54 | 901.46 | 901.75 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 18.41 | 17.89 | 17.84 | 17.30 | 18.19 | 23.51 | 20.85 | 23.34 | 21.56 | 22.01 | 62.37 | 21.72 | |

ARKANSAS RIVER BASIN

| FALL RIVER LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 15.23 | 14.09 | 8.25 | 9.31 | 10.09 | 23.68 | 36.26 | 33.38 | 37.93 | 18.32 | 6.26 | 15.10 | 227.9 |
| FY 1989 | 0.10 | 0.23 | 0.36 | 0.25 | 0.23 | 2.38 | 0.74 | 17.43 | 22.42 | 7.31 | 36.54 | 52.32 | 140.3 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 19.28 | 15.35 | 11.55 | 8.62 | 15.04 | 32.06 | 42.31 | 30.51 | 40.33 | 18.98 | 6.15 | 7.78 | 248.0 |
| FY 1989 | 0.23 | 0.18 | 0.26 | 0.25 | 0.22 | 0.25 | 0.24 | 14.21 | 21.15 | 5.63 | 19.17 | 67.70 | 129.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.61 | 1.76 | 1.23 | 0.95 | 1.04 | 2.17 | 3.11 | 4.45 | 4.86 | 3.69 | 3.10 | 4.03 | 33.00 |
| FY 1989 | 0.98 | 1.24 | 1.19 | 1.12 | 0.61 | 3.02 | 0.18 | 5.64 | 6.10 | 4.90 | 8.05 | 4.36 | 37.39 |
| DEVIATION | -1.63 | -0.52 | -0.04 | 0.17 | -0.43 | 0.85 | -2.93 | 1.19 | 1.24 | 1.21 | 4.95 | 0.33 | 4.39 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 947.56 | 947.37 | 947.30 | 947.22 | 947.29 | 948.07 | 947.82 | 948.73 | 948.85 | 949.08 | 954.45 | 949.16 | |
| MAXIMUM | 947.98 | 947.57 | 947.37 | 947.30 | 947.52 | 948.08 | 948.18 | 953.22 | 953.65 | 950.41 | 955.44 | 956.08 | |
| MINIMUM | 947.50 | 947.30 | 947.15 | 947.15 | 947.19 | 947.18 | 947.82 | 947.67 | 948.50 | 948.70 | 948.53 | 948.75 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 19.79 | 19.37 | 19.22 | 19.04 | 19.20 | 20.91 | 20.35 | 22.47 | 22.75 | 23.31 | 39.65 | 23.51 | |



ARKANSAS RIVER BASIN

| ELK CITY LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 18.46 | 17.90 | 8.53 | 10.18 | 9.80 | 25.74 | 41.73 | 40.68 | 42.54 | 21.54 | 5.05 | 14.88 | 257.0 |
| FY 1989 | 0.08 | 1.66 | 1.78 | 1.53 | 1.82 | 38.22 | 2.72 | 86.52 | 108.71 | 25.56 | 8.11 | 31.07 | 307.8 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 37.43 | 18.82 | 14.91 | 14.94 | 15.77 | 40.27 | 41.22 | 37.86 | 51.86 | 44.99 | 9.66 | 7.68 | 335.4 |
| FY 1989 | 0.86 | 0.81 | 0.86 | 0.85 | 0.67 | 11.24 | 25.61 | 79.12 | 108.35 | 19.17 | 11.24 | 29.96 | 288.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.81 | 2.22 | 1.35 | 1.23 | 1.17 | 2.33 | 3.45 | 4.71 | 5.10 | 3.63 | 3.15 | 4.33 | 35.48 |
| FY 1989 | 0.72 | 2.03 | 1.27 | 1.06 | 0.87 | 4.09 | 0.39 | 6.82 | 7.93 | 4.76 | 5.02 | 3.95 | 38.91 |
| DEVIATION | -2.09 | -0.19 | -0.08 | -0.17 | -0.30 | 1.76 | -3.06 | 2.11 | 2.83 | 1.13 | 1.87 | -0.38 | 3.43 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 795.50 | 795.52 | 795.62 | 795.70 | 795.87 | 801.35 | 796.25 | 797.38 | 796.47 | 797.50 | 796.44 | 796.45 | |
| MAXIMUM | 795.96 | 795.55 | 795.73 | 795.70 | 795.88 | 801.39 | 801.35 | 807.97 | 810.95 | 798.89 | 797.50 | 798.77 | |
| MINIMUM | 795.50 | 795.35 | 794.40 | 795.60 | 795.64 | 795.80 | 796.22 | 796.19 | 796.24 | 796.33 | 796.16 | 796.23 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 44.16 | 44.24 | 44.63 | 44.95 | 45.62 | 71.93 | 47.21 | 52.17 | 48.15 | 52.72 | 48.07 | 48.06 | |

## ARKANSAS RIVER BASIN

| BIG HILL | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1929 THRU 1978 | 1.69 | 1.19 | 0.75 | 1.05 | 0.67 | 1.69 | 2.30 | 3.13 | 3.60 | 1.73 | 0.27 | 1.33 | 19.4 |
| FY 1989 | 0.01 | 0.87 | 0.33 | 0.45 | 0.54 | 2.03 | 0.46 | 5.07 | 6.94 | 0.87 | 0.60 | 0.85 | 19.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1984 THRU 1989 | 3.69 | 1.28 | 1.02 | 0.51 | 2.25 | 2.89 | 3.03 | 2.88 | 2.20 | 0.32 | 0.69 | 0.58 | 21.4 |
| FY 1989 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.39 | 1.13 | 4.26 | 6.78 | 0.44 | 0.15 | 0.63 | 13.9 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.15 | 2.50 | 1.49 | 1.48 | 1.33 | 2.55 | 3.80 | 5.19 | 0.00 | 3.84 | 3.33 | 4.80 | 33.46 |
| FY 1989 | 0.75 | 3.65 | 1.28 | 1.20 | 0.68 | 4.61 | 0.29 | 6.01 | 6.77 | 4.66 | 4.59 | 3.09 | 37.58 |
| DEVIATION | -2.40 | 1.15 | -0.21 | -0.28 | -0.65 | 2.06 | -3.51 | 0.82 | 6.77 | 0.82 | 1.26 | -1.71 | 4.12 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 856.53 | 856.98 | 857.16 | 857.43 | 857.76 | 858.91 | 858.00 | 858.35 | 858.14 | 858.10 | 858.10 | 858.01 | |
| MAXIMUM | 856.91 | 856.99 | 857.16 | 857.43 | 857.79 | 858.95 | 858.91 | 860.42 | 861.59 | 858.30 | 858.11 | 858.30 | |
| MINIMUM | 856.53 | 856.37 | 856.89 | 857.16 | 837.38 | 857.67 | 858.00 | 857.87 | 858.14 | 857.93 | 857.79 | 858.01 | |
| POOL CONTENT-EOM (1000AC.FT) | 25.50 | 26.02 | 26.23 | 26.54 | 26.93 | 28.31 | 27.21 | 27.63 | 27.38 | 27.33 | 27.33 | 27.22 | |



## ARKANSAS RIVER BASIN

| OOLOGAH LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 152.90 | 138.22 | 80.40 | 91.90 | 84.20 | 179.83 | 276.30 | 289.73 | 290.68 | 163.74 | 51.80 | 107.14 | 1906.8 |
| FY'1989 | 5.09 | 54.55 | 30.05 | 42.50 | 44.33 | 138.82 | 95.40 | 270.68 | 591.27 | 71.76 | 98.13 | 318.25 | 1760.8 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 169.77 | 146.70 | 121.85 | 104.01 | 115.58 | 301.46 | 341.59 | 214.75 | 275.68 | 224.34 | 50.26 | 57.84 | 2123.8 |
| FY 1989 | 0.49 | 0.48 | 0.49 | 11.15 | 54.93 | 71.91 | 142.75 | 166.25 | 538.29 | 165.56 | 82.11 | 253.67 | 1488.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.14 | 2.42 | 1.51 | 1.45 | 1.33 | 2.58 | 3.70 | 5.03 | 5.22 | 3.61 | 3.31 | 4.59 | 37.89 |
| FY 1989 | 0.84 | 2.81 | 2.11 | 1.36 | 1.02 | 3.91 | 0.46 | 5.14 | 7.55 | 4.70 | 4.78 | 3.53 | 38.21 |
| DEVIATION | -2.30 | 0.39 | 0.60 | -0.09 | -0.31 | 1.33 | -3.24 | 0.11 | 2.33 | 1.09 | 1.47 | -1.06 | 0.32 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 635.46 | 637.09 | 637.87 | 638.61 | 638.07 | 639.96 | 637.98 | 640.81 | 641.89 | 638.27 | 638.21 | 639.89 | |
| MAXIMUM | 635.80 | 637.10 | 637.89 | 638.78 | 638.63 | 639.96 | 640.90 | 641.36 | 647.96 | 641.89 | 638.76 | 643.38 | |
| MINIMUM | 635.46 | 635.22 | 637.05 | 637.86 | 637.92 | 637.38 | 637.92 | 637.72 | 639.28 | 638.24 | 637.76 | 638.21 | |
| POOL CONTENT-EOM (1000AC.FT) | 481.76 | 527.26 | 549.68 | 571.77 | 555.52 | 612.92 | 552.84 | 639.92 | 674.98 | 561.54 | 559.74 | 610.78 | |

## ARKANSAS RIVER BASIN

| HULAH LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1918 THRU 1981 | 26.93 | 22.70 | 9.62 | 9.63 | 9.35 | 24.64 | 40.30 | 45.44 | 38.01 | 29.02 | 12.81 | 25.62 | 294.1 |
| FY 1989 | 1.18 | 5.71 | 3.92 | 4.51 | 5.25 | 45.88 | 10.06 | 29.26 | 175.00 | 7.47 | 18.25 | 122.30 | 428.8 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 37.85 | 22.37 | 26.19 | 13.92 | 13.23 | 46.18 | 51.42 | 44.40 | 54.93 | 30.43 | 6.34 | 12.26 | 359.5 |
| FY 1989 | 0.31 | 4.63 | 2.96 | 2.16 | 5.64 | 12.21 | 39.53 | 25.03 | 109.75 | 68.08 | 12.56 | 122.86 | 405.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.89 | 2.23 | 1.38 | 1.24 | 1.20 | 2.22 | 3.48 | 4.95 | 4.67 | 3.42 | 3.28 | 4.17 | 35.13 |
| FY 1989 | 1.27 | 2.51 | 1.24 | 1.11 | 1.11 | 3.75 | 0.21 | 5.08 | 9.89 | 3.01 | 7.09 | 5.62 | 41.89 |
| DEVIATION | -1.62 | 0.28 | -0.14 | -0.13 | -0.09 | 1.53 | -3.27 | 0.13 | 5.22 | -0.41 | 3.81 | 1.45 | 6.76 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 732.61 | 733.44 | 733.26 | 733.48 | 733.02 | 740.23 | 733.04 | 733.58 | 745.65 | 733.22 | 734.04 | 733.36 | |
| MAXIMUM | 733.03 | 734.07 | 733.44 | 733.49 | 733.51 | 740.88 | 740.23 | 735.97 | 753.95 | 745.65 | 735.44 | 747.58 | |
| MINIMUM | 732.46 | 732.46 | 733.00 | 733.03 | 733.00 | 733.01 | 733.00 | 733.00 | 733.27 | 733.22 | 733.08 | 733.33 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 29.81 | 32.77 | 32.11 | 32.92 | 31.23 | 62.63 | 31.30 | 33.29 | 95.50 | 31.97 | 34.99 | 32.48 | |



## ARKANSAS RIVER BASIN

| COPAN | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1936 THRU 1977 | 13.68 | 13.22 | 6.94 | 8.51 | 7.76 | 20.51 | 30.72 | 34.78 | 28.28 | 17.26 | 4.40 | 11.59 | 197.7 |
| FY 1989 | 0.50 | 7.01 | 2.73 | 2.52 | 4.79 | 35.56 | 20.88 | 34.28 | 206.34 | 20.50 | 6.71 | 14.26 | 356.1 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1984 THRU 1989 | 69.33 | 25.53 | 37.30 | 21.25 | 14.84 | 61.89 | 71.11 | 43.47 | 64.71 | 38.89 | 2.86 | 8.87 | 460.1 |
| FY 1989 | 0.44 | 3.80 | 1.46 | 2.08 | 5.66 | 7.28 | 45.27 | 21.18 | 120.26 | 108.36 | 4.21 | 14.58 | 334.6 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.04 | 2.28 | 1.39 | 1.33 | 1.23 | 2.41 | 3.51 | 4.83 | 4.96 | 3.44 | 3.14 | 3.90 | 35.46 |
| FY 1989 | 0.80 | 2.88 | 1.23 | 0.92 | 0.76 | 3.38 | 0.21 | 5.48 | 9.58 | 3.49 | 5.23 | 3.86 | 37.82 |
| DEVIATION | -2.24 | 0.60 | -0.16 | -0.41 | -0.47 | 0.97 | -3.30 | 0.65 | 4.62 | 0.05 | 2.09 | -0.04 | 2.36 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 709.74 | 710.15 | 710.25 | 710.24 | 710.01 | 714.83 | 710.03 | 712.12 | 723.73 | 710.40 | 710.47 | 710.12 | |
| MAXIMUM | 710.00 | 710.37 | 710.25 | 710.25 | 710.35 | 714.83 | 715.00 | 713.50 | 729.83 | 723.73 | 710.71 | 711.39 | |
| MINIMUM | 709.74 | 709.65 | 709.90 | 709.96 | 710.01 | 709.95 | 709.80 | 709.92 | 711.10 | 710.37 | 710.05 | 710.11 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 42.19 | 44.16 | 44.66 | 44.61 | 43.47 | 70.14 | 43.57 | 54.35 | 136.46 | 45.41 | 45.76 | 44.01 | |

ARKANSAS RIVER BASIN

| BIRCH LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1936 THRU 1979 | 2.40 | 1.65 | 1.02 | 0.96 | 0.96 | 3.02 | 3.18 | 5.61 | 3.12 | 1.78 | 0.82 | 1.95 | 26.5 |
| FY 1989 | 0.18 | 2.46 | 1.13 | 1.01 | 1.00 | 4.95 | 0.41 | 2.45 | 11.44 | 1.05 | 4.75 | 6.13 | 37.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1979 THRU 1989 | 3.88 | 1.89 | 1.92 | 1.53 | 2.08 | 4.93 | 3.74 | 4.98 | 4.39 | 1.04 | 0.56 | 0.86 | 31.8 |
| FY 1989 | 0.51 | 1.50 | 1.21 | 0.61 | 1.43 | 2.00 | 2.58 | 1.94 | 10.44 | 0.90 | 3.24 | 6.46 | 32.8 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.78 | 2.16 | 1.43 | 1.27 | 1.33 | 2.43 | 3.31 | 5.00 | 4.52 | 3.16 | 3.29 | 4.25 | 34.93 |
| FY 1989 | 1.39 | 3.16 | 1.61 | 1.40 | 1.30 | 3.16 | 0.27 | 4.50 | 8.83 | 3.33 | 9.33 | 5.25 | 43.53 |
| DEVIATION | -1.39 | 1.00 | 0.18 | 0.13 | -0.03 | 0.73 | -3.04 | -0.50 | 4.31 | 0.17 | 6.04 | 1.00 | 8.60 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 750.21 | 750.86 | 750.65 | 750.90 | 750.46 | 752.82 | 750.48 | 750.40 | 750.76 | 750.44 | 751.35 | 750.72 | |
| MAXIMUM | 750.78 | 751.51 | 750.86 | 750.90 | 750.95 | 753.04 | 752.82 | 752.10 | 757.92 | 751.04 | 752.72 | 753.43 | |
| MINIMUM | 750.21 | 750.03 | 750.29 | 750.47 | 750.46 | 750.44 | 750.48 | 750.40 | 750.40 | 750.44 | 750.08 | 750.58 | |
| POOL CONTENT-EOM (1000AC.FT) | 18.86 | 19.59 | 19.35 | 19.64 | 19.14 | 21.90 | 19.16 | 19.07 | 19.48 | 19.12 | 20.16 | 19.43 | |



ARKANSAS RIVER BASIN

| SKIATOOK LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1935 THRU 1978 | 13.47 | 8.09 | 3.91 | 3.61 | 4.29 | 12.59 | 15.35 | 28.43 | 16.19 | 10.64 | 4.09 | 12.37 | 133.0 |
| FY 1989 | 1.58 | 15.39 | 3.89 | 5.58 | 6.05 | 31.97 | 4.17 | 15.25 | 45.40 | 14.97 | 40.94 | 18.02 | 203.2 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1989 THRU 1989 | 4.76 | 1.87 | 0.61 | 0.54 | 0.86 | 0.61 | 4.03 | 4.41 | 1.89 | 7.06 | 29.69 | 20.12 | 76.4 |
| FY 1989 | 4.76 | 1.87 | 0.61 | 0.54 | 0.86 | 0.61 | 4.03 | 4.41 | 1.89 | 7.06 | 29.69 | 20.12 | 76.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.88 | 2.21 | 1.41 | 1.32 | 1.36 | 2.37 | 3.30 | 4.83 | 4.38 | 3.24 | 3.25 | 4.19 | 34.74 |
| FY 1989 | 1.38 | 4.05 | 1.50 | 1.44 | 1.29 | 3.24 | 0.21 | 4.18 | 7.80 | 4.25 | 8.63 | 4.52 | 42.49 |
| DEVIATION | -1.50 | 1.84 | 0.09 | 0.12 | -0.07 | 0.87 | -3.09 | -0.65 | 3.42 | 1.01 | 5.38 | 0.33 | 7.75 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 702.52 | 704.03 | 704.32 | 704.84 | 705.36 | 708.65 | 708.34 | 709.14 | 713.20 | 713.58 | 714.30 | 713.88 | |
| MAXIMUM | 703.19 | 704.05 | 704.32 | 705.35 | 705.36 | 708.65 | 708.83 | 709.22 | 713.25 | 714.03 | 716.50 | 715.65 | |
| MINIMUM | 702.52 | 702.30 | 703.94 | 704.32 | 704.02 | 705.36 | 708.34 | 707.96 | 709.12 | 712.92 | 713.12 | 713.88 | |
| POOL CONTENT-EOM (1000AC.FT) | 217.32 | 229.64 | 232.09 | 236.46 | 240.91 | 270.24 | 267.39 | 274.77 | 314.60 | 318.46 | 325.82 | 321.52 | |

ARKANSAS RIVER BASIN

| NEWT GRAHAM LOCK AND DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1957 | 306.03 | 159.47 | 104.65 | 137.73 | 123.85 | 203.04 | 501.27 | 562.13 | 549.77 | 233.60 | 99.67 | 137.64 | 3118.9 |
| FY 1989 | 26.38 | 92.63 | 64.46 | 96.59 | 168.49 | 259.29 | 309.52 | 240.10 | 937.69 | 441.92 | 245.06 | 580.26 | 3462.4 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 323.57 | 285.15 | 256.14 | 205.78 | 256.05 | 538.23 | 579.13 | 489.73 | 510.41 | 332.56 | 95.47 | 123.24 | 3995.5 |
| FY 1989 | 26.30 | 92.13 | 64.71 | 95.87 | 168.59 | 259.58 | 308.83 | 239.94 | 936.52 | 442.12 | 243.97 | 579.43 | 3458.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.12 | 2.36 | 1.54 | 1.46 | 1.47 | 2.53 | 3.61 | 4.88 | 4.73 | 3.28 | 3.20 | 4.32 | 36.50 |
| FY 1989 | 1.10 | 3.70 | 1.88 | 1.73 | 1.62 | 3.24 | 0.31 | 4.08 | 7.55 | 3.78 | 6.16 | 4.61 | 39.76 |
| DEVIATION | -2.02 | 1.34 | 0.34 | 0.27 | 0.15 | 0.71 | -3.30 | -0.80 | 2.82 | 0.50 | 2.96 | 0.29 | 3.26 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 532.43 | 532.53 | 532.36 | 532.72 | 532.58 | 532.20 | 532.60 | 532.19 | 532.47 | 531.93 | 532.29 | 532.50 | |
| MAXIMUM | 532.94 | 533.14 | 553.18 | 533.29 | 532.99 | 533.40 | 532.99 | 532.98 | 533.40 | 532.99 | 533.08 | 533.01 | |
| MINIMUM | 532.17 | 532.06 | 532.15 | 531.62 | 531.68 | 531.60 | 531.81 | 531.87 | 531.14 | 531.33 | 531.49 | 531.40 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 24.20 | 24.35 | 24.09 | 24.64 | 24.43 | 23.85 | 24.46 | 23.83 | 24.26 | 23.44 | 23.99 | 24.30 | |



ARKANSAS RIVER BASIN

| CHOUTEAU LOCK AND DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1957 | 306.03 | 159.47 | 104.65 | 137.73 | 123.85 | 203.31 | 501.22 | 562.13 | 549.77 | 233.60 | 99.67 | 137.64 | 3119.1 |
| FY 1989 | 20.08 | 92.18 | 75.92 | 136.07 | 211.93 | 297.32 | 337.49 | 246.35 | 943.14 | 441.62 | 225.95 | 536.92 | 3565.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 316.73 | 289.90 | 262.57 | 208.22 | 260.38 | 547.95 | 590.43 | 492.12 | 524.06 | 321.57 | 88.40 | 114.27 | 4016.6 |
| FY 1989 | 18.73 | 92.11 | 75.31 | 135.58 | 212.01 | 296.86 | 337.80 | 245.39 | 942.53 | 440.70 | 224.52 | 536.11 | 3557.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.40 | 2.83 | 2.00 | 1.90 | 1.99 | 2.91 | 4.15 | 5.22 | 5.06 | 3.06 | 2.93 | 4.16 | 39.61 |
| FY 1989 | 1.29 | 4.91 | 2.37 | 3.22 | 3.26 | 2.54 | 0.34 | 5.48 | 8.08 | 3.04 | 4.99 | 4.12 | 43.64 |
| DEVIATION | -2.11 | 2.08 | 0.37 | 1.32 | 1.27 | -0.37 | -3.81 | 0.26 | 3.02 | -0.02 | 2.06 | -0.04 | 4.03 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 511.51 | 511.28 | 511.39 | 511.49 | 511.34 | 511.28 | 511.50 | 511.35 | 511.26 | 511.18 | 511.35 | 511.35 | |
| MAXIMUM | 511.56 | 511.60 | 511.80 | 511.70 | 511.63 | 511.57 | 511.56 | 511.65 | 511.94 | 511.58 | 511.59 | 511.65 | |
| MINIMUM | 511.20 | 511.21 | 511.12 | 511.15 | 511.14 | 511.14 | 511.02 | 511.02 | 510.37 | 510.97 | 511.00 | 510.84 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 23.54 | 23.00 | 23.26 | 23.50 | 23.14 | 23.00 | 23.52 | 23.17 | 22.96 | 22.77 | 23.17 | 23.17 | |

ARKANSAS RIVER BASIN

| COUNCIL GROVE LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 5.97 | 4.43 | 2.97 | 2.79 | 3.75 | 7.35 | 10.32 | 12.52 | 16.44 | 12.31 | 5.02 | 7.52 | 91.4 |
| FY 1989 | 0.06 | 0.06 | 0.06 | 0.41 | 0.21 | 1.33 | 0.32 | 0.59 | 0.48 | 0.09 | 5.89 | 8.36 | 17.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 6.18 | 3.78 | 3.79 | 1.71 | 3.76 | 9.75 | 11.18 | 10.65 | 12.83 | 11.65 | 1.77 | 2.90 | 79.9 |
| FY 1989 | 0.52 | 0.39 | 0.32 | 0.31 | 0.28 | 0.36 | 0.48 | 0.37 | 0.33 | 0.74 | 0.39 | 0.24 | 4.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.59 | 1.63 | 1.19 | 0.86 | 0.91 | 1.99 | 3.10 | 4.60 | 4.92 | 3.83 | 3.54 | 3.86 | 33.02 |
| FY 1989 | 0.46 | 0.18 | 0.27 | 1.06 | 0.30 | 2.72 | 0.60 | 3.58 | 4.48 | 4.17 | 7.21 | 4.85 | 29.88 |
| DEVIATION | -2.13 | -1.45 | -0.92 | 0.20 | -0.61 | 0.73 | -2.50 | -1.02 | -0.44 | 0.34 | 3.67 | 0.99 | -3.14 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1271.75 | 1271.40 | 1271.16 | 1271.09 | 1270.92 | 1270.95 | 1270.48 | 1270.18 | 1269.81 | 1269.04 | 1270.69 | 1273.10 | |
| MAXIMUM | 1272.42 | 1271.75 | 1271.71 | 1271.18 | 1271.09 | 1270.96 | 1270.99 | 1270.48 | 1270.19 | 1269.81 | 1270.69 | 1273.24 | |
| MINIMUM | 1271.75 | 1271.40 | 1271.16 | 1270.99 | 1270.92 | 1270.67 | 1270.48 | 1270.13 | 1269.81 | 1269.04 | 1268.54 | 1270.67 | |
| POOL CONTENT-EOM (1000AC.FT) | 41.56 | 40.51 | 39.79 | 39.57 | 39.07 | 39.16 | 37.82 | 36.96 | 35.92 | 33.81 | 38.42 | 45.75 | |



ARKANSAS RIVER BASIN

| MARION LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1938 THRU 1971 | 3.16 | 1.28 | 1.49 | 1.94 | 2.08 | 3.31 | 5.91 | 8.70 | 10.17 | 7.13 | 1.78 | 4.79 | 51.7 |
| FY 1989 | 0.06 | 0.51 | 0.06 | 0.43 | 0.06 | 2.45 | 0.69 | 4.31 | 6.19 | 0.32 | 2.79 | 0.41 | 18.3 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 3.12 | 3.62 | 3.50 | 1.75 | 2.39 | 4.77 | 7.04 | 7.45 | 6.15 | 7.71 | 2.03 | 1.49 | 51.0 |
| FY 1989 | 0.44 | 0.23 | 0.20 | 0.31 | 0.28 | 0.31 | 0.30 | 0.31 | 0.30 | 0.31 | 0.31 | 0.25 | 3.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.50 | 1.57 | 1.07 | 0.80 | 0.96 | 1.88 | 2.73 | 4.45 | 4.68 | 3.82 | 3.26 | 3.73 | 31.47 |
| FY 1989 | 0.61 | 0.92 | 0.19 | 0.96 | 0.33 | 1.86 | 0.54 | 4.15 | 7.29 | 2.97 | 6.08 | 2.22 | 28.12 |
| DEVIATION | -1.89 | -0.65 | -0.88 | 0.16 | -0.63 | -0.02 | -2.21 | -0.30 | 2.61 | -0.85 | 2.82 | -1.51 | -3.35 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1347.27 | 1347.13 | 1346.98 | 1346.89 | 1346.63 | 1346.79 | 1346.39 | 1346.72 | 1347.40 | 1346.89 | 1346.94 | 1346.65 | |
| MAXIMUM | 1347.66 | 1347.73 | 1347.13 | 1347.00 | 1346.89 | 1346.84 | 1346.82 | 1346.90 | 1347.45 | 1347.41 | 1346.95 | 1346.95 | |
| MINIMUM | 1347.27 | 1347.12 | 1346.86 | 1346.85 | 1346.63 | 1346.33 | 1346.39 | 1346.16 | 1346.67 | 1346.89 | 1346.53 | 1346.62 | |
| POOL CONTENT-EOM (1000AC.FT) | 61.67 | 60.89 | 60.07 | 59.61 | 58.27 | 59.10 | 57.03 | 58.73 | 62.38 | 59.61 | 59.87 | 58.37 | |

ARKANSAS RIVER BASIN

| JOHN REDMOND DAM AND RES | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1922 THRU 1981 | 71.02 | 55.44 | 38.04 | 36.84 | 40.33 | 87.60 | 126.29 | 136.01 | 165.24 | 118.01 | 39.59 | 70.27 | 984.7 |
| FY 1989 | 2.86 | 4.68 | 4.47 | 5.75 | 4.74 | 6.66 | 4.65 | 22.85 | 77.55 | 36.10 | 150.21 | 85.49 | 406.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 75.96 | 67.57 | 50.77 | 28.53 | 53.24 | 118.32 | 158.96 | 131.38 | 157.42 | 125.59 | 37.19 | 50.20 | 1055.1 |
| FY 1989 | 2.19 | 1.78 | 2.94 | 1.35 | 1.22 | 4.35 | 2.87 | 7.40 | 69.65 | 34.53 | 51.88 | 183.12 | 363.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.63 | 1.69 | 1.18 | 0.90 | 0.96 | 2.06 | 2.99 | 4.44 | 4.89 | 3.82 | 3.40 | 4.04 | 33.00 |
| FY 1989 | 0.48 | 0.43 | 0.26 | 1.06 | 0.30 | 2.70 | 0.61 | 3.58 | 4.53 | 4.13 | 7.14 | 4.78 | 30.00 |
| DEVIATION | -2.15 | -1.26 | -0.92 | 0.16 | -0.66 | 0.64 | -2.38 | -0.86 | -0.36 | 0.31 | 3.74 | 0.74 | -3.00 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1037.58 | 1037.74 | 1037.80 | 1038.18 | 1038.41 | 1038.39 | 1038.20 | 1039.48 | 1039.94 | 1039.68 | 1047.97 | 1039.10 | |
| MAXIMUM | 1037.74 | 1037.78 | 1037.89 | 1038.19 | 1038.41 | 1038.55 | 1038.50 | 1039.54 | 1042.43 | 1039.99 | 1047.97 | 1048.01 | |
| MINIMUM | 1037.57 | 1037.44 | 1037.70 | 1037.75 | 1038.08 | 1038.22 | 1038.20 | 1037.71 | 1039.48 | 1038.48 | 1039.50 | 1039.04 | |
| POOL CONTENT-EOM (1000AC.FT) | 50.86 | 52.30 | 52.84 | 56.36 | 58.58 | 58.38 | 56.56 | 68.95 | 73.45 | 70.91 | 165.71 | 65.23 | |



ARKANSAS RIVER BASIN

| PENSACOLA LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 322.60 | 323.22 | 236.46 | 249.34 | 281.52 | 462.47 | 648.79 | 692.47 | 729.00 | 403.86 | 171.64 | 260.79 | 4782.2 |
| FY 1989 | 52.26 | 299.50 | 294.35 | 328.26 | 345.12 | 532.56 | 246.55 | 274.91 | 423.57 | 265.19 | 420.30 | 535.93 | 4018.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 385.64 | 418.94 | 403.33 | 296.08 | 363.78 | 642.27 | 743.70 | 479.22 | 491.77 | 429.23 | 223.36 | 220.69 | 5098.0 |
| FY 1989 | 132.21 | 294.27 | 227.64 | 325.21 | 304.56 | 504.97 | 254.56 | 218.64 | 346.93 | 245.49 | 382.39 | 600.44 | 3837.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.39 | 2.71 | 1.89 | 1.73 | 1.73 | 2.91 | 4.02 | 5.15 | 5.26 | 3.58 | 3.39 | 4.64 | 40.40 |
| FY 1989 | 1.50 | 2.85 | 2.73 | 2.22 | 1.66 | 5.93 | 0.34 | 4.79 | 5.59 | 6.25 | 6.08 | 5.45 | 45.39 |
| DEVIATION | -1.89 | 0.14 | 0.84 | 0.49 | -0.07 | 3.02 | -3.68 | -0.36 | 0.33 | 2.67 | 2.69 | 0.81 | 4.99 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 740.24 | 740.17 | 741.61 | 741.51 | 742.34 | 742.68 | 741.73 | 742.58 | 744.02 | 744.00 | 744.37 | 742.41 | |
| MAXIMUM | 742.58 | 740.92 | 741.61 | 741.61 | 743.44 | 744.95 | 743.17 | 743.90 | 745.16 | 744.63 | 744.54 | 744.95 | |
| MINIMUM | 740.21 | 739.97 | 739.50 | 740.58 | 741.48 | 742.07 | 741.12 | 741.63 | 742.34 | 743.54 | 743.36 | 742.36 | |
| POOL CONTENT-EOM (1000AC.FT) | 1462.08 | 1459.14 | 1520.23 | 1515.93 | 1551.96 | 1566.92 | 1525.39 | 1562.52 | 1626.92 | 1626.00 | 1643.02 | 1555.04 | |

ARKANSAS RIVER BASIN

| LAKE HUDSON | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 366.07 | 326.50 | 276.23 | 277.65 | 316.68 | 493.77 | 703.76 | 798.60 | 797.85 | 469.55 | 232.23 | 292.51 | 5351.4 |
| FY 1989 | 144.99 | 344.93 | 298.91 | 413.55 | 406.61 | 646.61 | 326.48 | 251.90 | 436.26 | 271.93 | 404.13 | 604.56 | 4550.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 414.51 | 482.51 | 475.68 | 350.79 | 423.44 | 756.15 | 901.02 | 564.30 | 603.66 | 455.67 | 228.00 | 234.68 | 5892.4 |
| FY 1989 | 139.81 | 331.38 | 297.79 | 412.76 | 404.55 | 642.60 | 323.72 | 244.30 | 433.13 | 266.20 | 401.57 | 609.22 | 4507.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.78 | 3.02 | 2.17 | 1.94 | 2.08 | 3.16 | 4.26 | 5.47 | 5.21 | 3.23 | 3.42 | 4.66 | 42.40 |
| FY 1989 | 1.26 | 3.11 | 2.52 | 2.66 | 3.83 | 3.92 | 0.36 | 4.12 | 7.33 | 4.43 | 5.08 | 3.67 | 42.29 |
| DEVIATION | -2.52 | 0.09 | 0.35 | 0.72 | 1.75 | 0.76 | -3.90 | -1.35 | 2.12 | 1.20 | 1.66 | -0.99 | -0.11 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 619.36 | 619.34 | 619.31 | 619.24 | 619.31 | 619.39 | 619.27 | 619.51 | 619.39 | 619.56 | 620.19 | 619.17 | |
| MAXIMUM | 620.02 | 619.95 | 619.85 | 620.29 | 620.32 | 620.32 | 619.63 | 619.59 | 621.80 | 620.17 | 620.68 | 620.19 | |
| MINIMUM | 618.95 | 618.95 | 619.02 | 619.00 | 619.07 | 618.58 | 618.71 | 618.68 | 618.87 | 619.00 | 618.98 | 618.40 | |
| POOL CONTENT-EOM (1000AC.FT) | 204.28 | 204.06 | 203.73 | 202.95 | 203.73 | 204.61 | 203.28 | 205.94 | 204.61 | 206.49 | 213.51 | 202.18 | |



ARKANSAS RIVER BASIN

| FORT GIBSON LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1980 | 392.66 | 377.51 | 305.41 | 312.54 | 355.69 | 546.77 | 797.48 | 887.79 | 880.74 | 507.86 | 248.96 | 323.89 | 5937.3 |
| FY 1989 | 127.64 | 352.07 | 303.67 | 453.22 | 502.02 | 741.62 | 329.65 | 257.06 | 551.01 | 265.49 | 397.88 | 602.97 | 4884.3 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1974 THRU 1989 | 474.99 | 501.15 | 524.87 | 408.30 | 404.23 | 847.71 | 984.54 | 610.27 | 629.80 | 496.73 | 216.80 | 228.76 | 6328.2 |
| FY 1989 | 143.26 | 326.63 | 279.98 | 419.66 | 546.47 | 704.39 | 363.64 | 259.52 | 540.48 | 262.74 | 351.77 | 632.99 | 4831.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.63 | 2.96 | 2.16 | 1.97 | 2.13 | 3.14 | 4.26 | 5.40 | 5.12 | 3.05 | 3.21 | 4.39 | 41.42 |
| FY 1989 | 1.30 | 3.87 | 3.99 | 4.55 | 5.65 | 4.25 | 0.29 | 8.14 | 8.98 | 4.81 | 4.83 | 4.10 | 54.76 |
| DEVIATION | -2.33 | 0.91 | 1.83 | 2.58 | 3.52 | 1.11 | -3.97 | 2.74 | 3.86 | 1.76 | 1.62 | -0.29 | 13.34 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 553.07 | 554.26 | 555.34 | 556.85 | 554.52 | 556.10 | 554.00 | 553.40 | 553.52 | 553.20 | 555.15 | 553.26 | |
| MAXIMUM | 554.78 | 556.51 | 556.14 | 557.68 | 557.66 | 558.47 | 557.03 | 556.06 | 560.31 | 555.88 | 555.80 | 556.02 | |
| MINIMUM | 552.81 | 552.31 | 553.75 | 553.37 | 553.77 | 553.36 | 553.50 | 553.40 | 553.40 | 552.78 | 553.20 | 553.24 | |
| POOL CONTENT-EOM (1000AC.FT) | 347.81 | 370.22 | 391.30 | 422.26 | 375.23 | 406.59 | 365.20 | 353.98 | 356.22 | 350.24 | 387.50 | 351.36 | |

ARKANSAS RIVER BASIN

| WEBBERS FALLS L&D | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1940 THRU 1981 | 1163.75 | 1067.84 | 732.82 | 668.85 | 751.95 | 1291.80 | 1905.47 | 2350.06 | 1996.12 | 1593.36 | 687.71 | 627.23 | 14837.0 |
| FY 1989 | 283.24 | 508.36 | 443.50 | 647.21 | 997.09 | 1316.63 | 1094.28 | 850.11 | 2728.46 | 1256.13 | 1138.71 | 2437.88 | 13701.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1435.34 | 1242.92 | 1129.41 | 926.73 | 986.45 | 2262.48 | 2520.95 | 1967.84 | 2134.19 | 1335.74 | 524.69 | 622.60 | 17089.3 |
| FY 1989 | 271.03 | 509.98 | 434.02 | 650.95 | 997.34 | 1305.47 | 1091.60 | 849.04 | 2713.86 | 1253.12 | 1141.88 | 2434.30 | 13652.6 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.41 | 2.83 | 2.08 | 1.91 | 2.12 | 2.97 | 4.26 | 5.28 | 5.09 | 3.01 | 2.94 | 4.21 | 40.11 |
| FY 1989 | 1.10 | 5.18 | 2.78 | 3.51 | 4.90 | 4.24 | 0.67 | 7.83 | 7.14 | 4.01 | 3.92 | 3.93 | 49.21 |
| DEVIATION | -2.31 | 2.35 | 0.70 | 1.60 | 2.78 | 1.27 | -3.59 | 2.55 | 2.05 | 1.00 | 0.98 | -0.28 | 9.10 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 489.67 | 489.32 | 489.96 | 489.46 | 489.30 | 490.06 | 489.80 | 489.39 | 490.16 | 489.93 | 489.13 | 489.07 | |
| MAXIMUM | 490.16 | 490.35 | 490.21 | 490.23 | 490.44 | 490.47 | 490.35 | 490.43 | 490.34 | 490.44 | 490.49 | 490.90 | |
| MINIMUM | 487.69 | 488.35 | 488.47 | 487.63 | 487.87 | 488.26 | 488.23 | 489.00 | 487.53 | 487.47 | 488.64 | 488.95 | |
| POOL CONTENT-EOM (1000AC.FT) | 166.35 | 162.38 | 169.65 | 164.19 | 162.15 | 170.83 | 167.83 | 163.17 | 172.05 | 169.31 | 160.21 | 159.53 | |



ARKANSAS RIVER BASIN

| TENKILLER LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 52.66 | 73.08 | 76.11 | 82.05 | 97.10 | 136.73 | 174.34 | 188.34 | 119.59 | 53.49 | 40.27 | 35.47 | 1129.2 |
| FY 1989 | 8.33 | 28.96 | 26.58 | 57.32 | 225.92 | 221.55 | 92.33 | 113.06 | 194.38 | 42.84 | 22.02 | 31.93 | 1065.2 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 59.40 | 52.76 | 90.51 | 95.41 | 66.65 | 119.08 | 154.47 | 100.24 | 79.21 | 53.33 | 40.83 | 26.22 | 938.1 |
| FY 1989 | 11.86 | 6.74 | 8.26 | 37.23 | 200.44 | 233.79 | 128.07 | 86.56 | 160.82 | 73.77 | 25.90 | 21.02 | 994.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.62 | 3.17 | 2.58 | 2.22 | 2.66 | 3.52 | 4.59 | 5.65 | 4.89 | 3.15 | 3.29 | 4.32 | 43.66 |
| FY 1989 | 1.86 | 2.90 | 2.45 | 3.14 | 5.91 | 4.83 | 0.47 | 6.52 | 8.33 | 6.65 | 4.71 | 4.11 | 51.88 |
| DEVIATION | -1.76 | -0.27 | -0.13 | 0.92 | 3.25 | 1.31 | -4.12 | 0.87 | 3.44 | 3.50 | 1.42 | -0.21 | 8.22 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 628.60 | 630.20 | 631.52 | 632.93 | 635.49 | 634.32 | 631.23 | 632.85 | 635.02 | 632.30 | 631.63 | 632.21 | |
| MAXIMUM | 629.17 | 630.20 | 631.52 | 632.94 | 638.56 | 636.54 | 635.15 | 633.49 | 638.20 | 635.07 | 632.34 | 632.64 | |
| MINIMUM | 628.60 | 628.41 | 630.20 | 631.30 | 632.53 | 632.02 | 631.01 | 631.23 | 632.68 | 632.02 | 631.60 | 631.63 | |
| POOL CONTENT-EOM (1000AC.FT) | 611.48 | 631.16 | 647.81 | 666.28 | 700.01 | 684.49 | 644.01 | 665.23 | 693.67 | 658.03 | 649.25 | 656.85 | |

CONCHAS LAKE

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1940 thru 1989 | 9.57 | 3.79 | 3.64 | 3.79 | 4.18 | 4.29 | 15.41 | 28.47 | 23.74 | 23.44 | 27.49 | 20.70 | 168.51 |
| FY 1989 | 3.37 | 1.72 | 2.47 | 3.29 | 4.32 | 3.73 | 1.33 | 1.75 | 8.12 | 6.83 | 18.65 | 8.60 | 64.20 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1941 thru 1989 | 8.31 | 1.91 | 1.58 | .63 | 1.03 | 2.45 | 14.52 | 18.27 | 15.40 | 17.56 | 17.76 | 19.55 | 118.98 |
| FY 1989 | 9.78 | 3.00 | .12 | .0 | .0 | 5.71 | 11.63 | 10.93 | 7.12 | 13.62 | 2.20 | 6.07 | 70.19 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1940 thru 1989 | 1.06 | .51 | .45 | .34 | .41 | .61 | .85 | 1.61 | 1.67 | 2.38 | 2.44 | 1.34 | 13.63 |
| FY 1989 | .42 | .19 | .18 | .30 | .54 | .22 | .13 | .63 | 1.65 | 2.33 | 3.77 | 1.95 | 12.31 |
| Pool Elevation (EOM) | 4195.70 | 4195.20 | 4195.32 | 4195.53 | 4195.77 | 4195.07 | 4193.12 | 4191.01 | 4190.66 | 4189.03 | 4190.18 | 4190.11 | |
| Maximum | 4196.75 | 4195.65 | 4195.32 | 4195.53 | 4195.77 | 4195.80 | 4194.98 | 4193.05 | 4190.98 | 4190.67 | 4190.18 | 4190.52 | |
| Minimum | 4195.70 | 4195.20 | 4195.20 | 4195.32 | 4195.49 | 4195.07 | 4193.12 | 4191.01 | 4190.66 | 4188.79 | 4188.72 | 4190.11 | |
| Pool Content (EOM) (1000 Ac-Ft) | 267.97 | 263.79 | 264.79 | 266.54 | 268.56 | 262.71 | 246.91 | 230.75 | 228.16 | 216.48 | 224.66 | 224.15 | |





| SANFORD RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 21.36 | 3.42 | 1.97 | 3.18 | 2.09 | 2.58 | 11.47 | 35.88 | 38.51 | 37.66 | 35.93 | 30.86 | 224.9 |
| FY '1989 | 1.81 | 1.36 | 1.23 | 1.59 | 3.99 | 2.33 | 1.98 | 23.84 | 24.86 | 8.23 | 20.04 | 11.18 | 102.4 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| LAKE HAS NOT FILLED | | | | | | | | | | | | | |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.32 | 0.60 | 0.49 | 0.45 | 0.48 | 0.68 | 1.14 | 2.52 | 2.36 | 2.68 | 2.48 | 1.62 | 16.82 |
| FY 1989 | 0.56 | 0.07 | 0.46 | 0.44 | 0.55 | 0.60 | 0.50 | 2.61 | 6.36 | 3.57 | 5.46 | 3.11 | 24.29 |
| DEVIATION | -0.76 | -0.53 | -0.03 | -0.01 | 0.07 | -0.08 | -0.64 | 0.09 | 4.00 | 0.89 | 2.98 | 1.49 | 7.47 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 2902.38 | 2902.25 | 2901.92 | 2901.66 | 2901.35 | 2900.74 | 2899.75 | 2900.84 | 2902.24 | 2901.47 | 2902.14 | 2902.12 | |
| MAXIMUM | 2903.13 | 2902.40 | 2902.29 | 2902.11 | 2901.66 | 2901.43 | 2900.74 | 2901.07 | 2902.24 | 2902.28 | 2902.14 | 2902.44 | |
| MINIMUM | 2902.35 | 2901.94 | 2901.92 | 2901.63 | 2901.34 | 2900.74 | 2899.75 | 2899.48 | 2900.72 | 2901.47 | 2901.10 | 2902.03 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 379.86 | 378.54 | 375.18 | 372.58 | 369.47 | 363.40 | 353.72 | 364.39 | 378.43 | 370.67 | 377.41 | 377.21 | |

ARKANSAS RIVER BASIN

| NORMAN RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1961 | 3.80 | 0.90 | 1.60 | 1.10 | 2.10 | 4.20 | 9.50 | 13.70 | 12.10 | 4.40 | 0.70 | 2.40 | 56.5 |
| FY 1989 | 0.67 | 3.10 | 2.71 | 4.33 | 8.50 | 6.87 | 2.14 | 5.19 | 39.78 | 12.04 | 11.67 | 9.36 | 106.4 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 3.63 | 4.16 | 1.34 | 2.49 | 1.96 | 5.71 | 6.38 | 4.03 | 7.82 | 2.98 | 0.63 | 0.39 | 41.5 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.35 | 0.00 | 21.60 | 21.66 | 8.83 | 5.41 | 59.9 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.89 | 2.07 | 1.51 | 1.32 | 1.54 | 2.23 | 3.48 | 5.50 | 4.35 | 2.90 | 2.60 | 3.48 | 33.87 |
| FY 1989 | 2.69 | 2.63 | 2.16 | 2.49 | 3.13 | 2.63 | 0.34 | 4.34 | 10.65 | 4.72 | 9.16 | 9.02 | 53.96 |
| DEVIATION | -0.20 | 0.56 | 0.65 | 1.17 | 1.59 | 0.40 | -3.14 | -1.16 | 6.30 | 1.82 | 6.56 | 5.54 | 20.09 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1036.86 | 1037.06 | 1037.23 | 1037.65 | 1038.83 | 1039.56 | 1038.91 | 1039.10 | 1041.33 | 1039.12 | 1038.94 | 1039.07 | |
| MAXIMUM | 1037.15 | 1037.13 | 1037.23 | 1037.65 | 1038.83 | 1039.81 | 1039.56 | 1039.29 | 1043.79 | 1041.33 | 1040.38 | 1040.04 | |
| MINIMUM | 1036.86 | 1036.74 | 1037.01 | 1037.21 | 1037.57 | 1038.83 | 1029.19 | 1037.79 | 1039.10 | 1039.09 | 1038.94 | 1038.80 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 107.03 | 108.15 | 109.13 | 111.57 | 118.58 | 123.01 | 119.06 | 120.21 | 134.38 | 120.33 | 119.24 | 120.03 | |

ARKANSAS RIVER BASIN

| OPTIMA LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT | | | | | | | | | | | | | |
| AVG 1939 THRU 1 | 2.10 | 0.82 | 0.96 | 0.89 | 1.05 | 1.05 | 1.57 | 5.60 | 6.75 | 3.77 | 3.36 | 3.30 | 31.2 |
| FY 198 | 0.04 | 0.06 | 0.04 | 0.04 | 0.03 | 0.10 | 0.15 | 2.97 | 0.43 | 0.12 | 0.12 | 0.17 | 4.3 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| LAKE HAS NOT FILLED | | | | | | | | | | | | | |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.13 | 0.59 | 0.40 | 0.37 | 0.42 | 0.77 | 1.23 | 2.64 | 2.25 | 2.69 | 2.41 | 1.62 | 16.52 |
| FY 1989 | 0.34 | 0.02 | 0.68 | 0.71 | 0.71 | 0.29 | 0.42 | 2.70 | 6.69 | 2.75 | 4.54 | 2.32 | 22.17 |
| DEVIATION | -0.79 | -0.57 | 0.28 | 0.34 | 0.29 | -0.48 | -0.81 | 0.06 | 4.44 | 0.06 | 2.13 | 0.70 | 5.65 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 2717.15 | 2716.85 | 2716.75 | 2716.70 | 2716.70 | 2716.65 | 2716.35 | 2719.85 | 2719.75 | 2719.20 | 2718.70 | 2718.25 | |
| MAXIMUM | 2717.40 | 2717.15 | 2716.85 | 2716.75 | 2716.70 | 2716.70 | 2716.65 | 2720.05 | 2719.90 | 2719.75 | 2719.95 | 2718.70 | |
| MINIMUM | 2717.15 | 2716.85 | 2716.75 | 2716.70 | 2716.70 | 2716.65 | 2716.35 | 2716.15 | 2719.75 | 2719.20 | 2718.70 | 2718.25 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 2.55 | 2.36 | 2.31 | 2.28 | 2.28 | 2.25 | 2.08 | 4.60 | 4.51 | 4.04 | 3.64 | 3.30 | |

ARKANSAS RIVER BASIN

| FORT SUPPLY LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 5.96 | 3.34 | 1.83 | 1.92 | 3.26 | 3.01 | 4.63 | 12.05 | 11.42 | 4.28 | 3.50 | 3.59 | 58.8 |
| FY 1989 | 2.72 | 2.79 | 3.43 | 3.47 | 3.35 | 4.25 | 3.71 | 8.94 | 4.44 | 1.59 | 2.70 | 2.91 | 44.3 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1.74 | 1.36 | 1.46 | 1.91 | 2.30 | 3.24 | 3.26 | 8.13 | 3.89 | 0.92 | 0.54 | 0.76 | 29.5 |
| FY 1989 | 2.02 | 2.32 | 3.14 | 3.21 | 3.34 | 3.73 | 3.16 | 6.58 | 4.45 | 0.58 | 1.42 | 2.16 | 36.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.60 | 0.94 | 0.67 | 0.64 | 0.88 | 1.30 | 2.25 | 4.23 | 3.11 | 1.98 | 2.44 | 2.25 | 22.29 |
| FY 1989 | 1.15 | 0.25 | 0.18 | 0.53 | 1.11 | 1.33 | 0.82 | 5.08 | 6.87 | 2.75 | 4.73 | 2.74 | 27.54 |
| DEVIATION | -0.45 | -0.69 | -0.49 | -0.11 | 0.23 | 0.03 | -1.43 | 0.85 | 3.76 | 0.77 | 2.29 | 0.49 | 5.25 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 2003.94 | 2004.08 | 2004.07 | 2004.10 | 2004.05 | 2004.13 | 2003.89 | 2004.46 | 2003.98 | 2003.85 | 2003.96 | 2004.08 | |
| MAXIMUM | 2004.21 | 2004.12 | 2004.13 | 2004.14 | 2004.16 | 2004.14 | 2004.13 | 2006.33 | 2004.75 | 2004.14 | 2004.32 | 2004.48 | |
| MINIMUM | 2003.91 | 2003.91 | 2004.04 | 2004.03 | 2003.86 | 2003.92 | 2003.85 | 2003.89 | 2003.98 | 2003.82 | 2003.84 | 2003.94 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 13.78 | 14.04 | 14.02 | 14.08 | 13.99 | 14.14 | 13.69 | 14.78 | 13.85 | 13.62 | 13.82 | 14.04 | |



ARKANSAS RIVER BASIN

| CANTON LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 18.09 | 5.83 | 3.94 | 4.22 | 5.63 | 8.35 | 13.59 | 34.74 | 36.74 | 27.60 | 9.76 | 11.25 | 179.7 |
| FY 1989 | 4.25 | 5.22 | 8.05 | 8.90 | 7.86 | 13.29 | 11.61 | 34.69 | 61.09 | 24.40 | 18.35 | 14.79 | 212.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 3.12 | 4.82 | 5.63 | 3.96 | 3.47 | 6.80 | 12.52 | 6.26 | 15.41 | 11.53 | 6.78 | 6.09 | 86.4 |
| FY 1989 | 0.75 | 1.49 | 1.54 | 1.54 | 1.39 | 1.54 | 8.23 | 14.44 | 33.57 | 53.04 | 21.93 | 10.90 | 150.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.46 | 0.91 | 0.60 | 0.54 | 0.71 | 1.13 | 1.64 | 3.37 | 2.80 | 2.56 | 2.49 | 1.79 | 20.00 |
| FY 1989 | 0.69 | 0.16 | 0.73 | 0.70 | 0.93 | 1.14 | 0.41 | 4.82 | 6.63 | 2.64 | 4.46 | 2.12 | 25.43 |
| DEVIATION | -0.77 | -0.75 | 0.13 | 0.16 | 0.22 | 0.01 | -1.23 | 1.45 | 3.83 | 0.08 | 1.97 | 0.33 | 5.43 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1611.45 | 1611.85 | 1612.53 | 1613.46 | 1614.29 | 1615.56 | 1615.54 | 1617.51 | 1620.10 | 1616.28 | 1615.45 | 1615.64 | |
| MAXIMUM | 1611.45 | 1611.85 | 1612.53 | 1613.46 | 1614.29 | 1615.56 | 1615.75 | 1617.51 | 1620.46 | 1620.10 | 1616.29 | 1616.03 | |
| MINIMUM | 1611.03 | 1611.42 | 1611.85 | 1612.53 | 1613.46 | 1614.29 | 1615.54 | 1615.38 | 1617.51 | 1616.28 | 1615.38 | 1615.45 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 82.39 | 85.10 | 89.86 | 96.56 | 102.75 | 112.62 | 112.46 | 128.79 | 152.30 | 118.43 | 111.75 | 113.26 | |

ARKANSAS RIVER BASIN

| ARCADIA LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1938 THRU 1982 | 1.91 | 1.63 | 0.96 | 1.36 | 1.39 | 2.43 | 3.60 | 7.60 | 5.08 | 2.06 | 1.03 | 1.99 | 28.1 |
| FY 1989 | 3.44 | 3.84 | 1.29 | 1.81 | 2.80 | 3.89 | 1.10 | 6.61 | 25.53 | 4.75 | 16.02 | 22.83 | 93.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1989 THRU 1989 | 3.79 | 3.19 | 0.00 | 0.00 | 0.00 | 0.16 | 1.24 | 5.20 | 22.16 | 5.43 | 15.01 | 21.46 | 77.6 |
| FY 1989 | 3.79 | 3.19 | 0.00 | 0.00 | 0.00 | 0.16 | 1.24 | 5.20 | 22.16 | 5.43 | 15.01 | 21.46 | 77.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.48 | 2.33 | 1.47 | 1.24 | 1.45 | 2.16 | 3.22 | 5.32 | 4.25 | 2.77 | 2.55 | 3.38 | 33.62 |
| FY 1989 | 2.73 | 3.01 | 0.88 | 1.27 | 1.86 | 2.57 | 0.12 | 4.89 | 12.70 | 3.25 | 10.65 | 9.80 | 53.73 |
| DEVIATION | -0.75 | 0.68 | -0.59 | 0.03 | 0.41 | 0.41 | -3.10 | -0.43 | 8.45 | 0.48 | 8.10 | 6.42 | 20.11 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1001.95 | 1001.97 | 1002.58 | 1003.49 | 1004.99 | 1006.67 | 1006.09 | 1006.21 | 1007.17 | 1006.10 | 1006.07 | 1006.31 | |
| MAXIMUM | 1003.29 | 1003.33 | 1002.58 | 1003.49 | 1004.99 | 1006.71 | 1006.91 | 1007.67 | 1010.59 | 1007.17 | 1010.21 | 1014.39 | |
| MINIMUM | 1001.93 | 1001.92 | 1001.97 | 1002.58 | 1003.43 | 1004.99 | 1003.47 | 1005.87 | 1006.21 | 1006.02 | 1006.04 | 1006.05 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 20.74 | 20.77 | 21.74 | 23.22 | 25.77 | 28.82 | 27.74 | 27.96 | 29.76 | 27.75 | 27.70 | 28.15 | |



ARKANSAS RIVER BASIN

| EUFAULA LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1923 THRU 1981 | 332.38 | 246.54 | 202.92 | 218.39 | 262.49 | 353.60 | 526.38 | 766.88 | 603.75 | 252.71 | 144.26 | 212.12 | 4122.4 |
| FY 1989 | 50.38 | 136.66 | 111.47 | 253.53 | 775.44 | 558.35 | 137.45 | 599.90 | 1362.25 | 298.21 | 232.26 | 668.92 | 5184.8 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 146.35 | 232.95 | 220.67 | 296.38 | 256.75 | 441.16 | 388.59 | 485.36 | 590.85 | 247.79 | 151.45 | 92.84 | 3551.1 |
| FY 1989 | 28.63 | 20.91 | 25.22 | 135.72 | 731.21 | 585.35 | 272.86 | 382.74 | 1245.70 | 379.80 | 198.54 | 512.27 | 4518.9 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.15 | 2.45 | 1.89 | 1.64 | 1.98 | 2.72 | 3.85 | 5.54 | 4.42 | 3.03 | 2.80 | 3.90 | 37.37 |
| FY 1989 | 2.78 | 2.99 | 2.50 | 2.72 | 4.69 | 3.51 | 0.82 | 6.23 | 8.23 | 4.48 | 5.56 | 8.70 | 53.21 |
| DEVIATION | -0.37 | 0.54 | 0.61 | 1.08 | 2.71 | 0.79 | -3.03 | 0.69 | 3.81 | 1.45 | 2.76 | 4.80 | 15.84 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 583.33 | 584.28 | 585.00 | 585.96 | 586.27 | 585.74 | 584.06 | 585.69 | 586.35 | 585.18 | 585.05 | 586.18 | |
| MAXIMUM | 583.53 | 584.34 | 585.00 | 586.05 | 588.30 | 587.04 | 585.74 | 586.99 | 591.42 | 586.53 | 585.71 | 587.74 | |
| MINIMUM | 583.31 | 583.03 | 584.25 | 584.00 | 584.70 | 584.95 | 584.02 | 584.05 | 585.50 | 585.11 | 584.75 | 585.00 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 2143.74 | 2239.83 | 2314.57 | 2417.58 | 2451.82 | 2393.98 | 2217.00 | 2388.61 | 2460.69 | 2333.88 | 2319.93 | 2441.84 | |

ARKANSAS RIVER BASIN

| R.S.KERR LOCK AND DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1943 THRU 1981 | 1283.00 | 1231.74 | 1064.24 | 964.67 | 1176.02 | 1963.52 | 2466.04 | 3141.04 | 2757.85 | 2170.09 | 986.93 | 1279.80 | 20484.9 |
| FY 1989 | 322.31 | 582.54 | 490.31 | 927.87 | 2525.75 | 2591.01 | 1684.96 | 1876.76 | 4650.25 | 1812.50 | 1396.16 | 3031.14 | 21891.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1706.89 | 1591.34 | 1538.26 | 1377.30 | 1408.52 | 2943.18 | 3169.44 | 2738.83 | 2913.45 | 1615.69 | 713.39 | 742.67 | 22459.0 |
| FY 1989 | 293.63 | 545.43 | 492.61 | 897.59 | 2530.75 | 2594.54 | 1655.52 | 1868.29 | 4630.17 | 1783.21 | 1374.55 | 3003.39 | 21669.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.60 | 3.07 | 2.57 | 2.13 | 2.61 | 3.43 | 4.54 | 5.61 | 4.69 | 3.16 | 3.15 | 4.19 | 42.75 |
| FY 1989 | 1.21 | 3.84 | 1.78 | 2.99 | 5.04 | 4.80 | 1.22 | 8.50 | 8.14 | 4.00 | 2.42 | 6.82 | 50.76 |
| DEVIATION | -2.39 | 0.77 | -0.79 | 0.86 | 2.43 | 1.37 | -3.32 | 2.89 | 3.45 | 0.84 | -0.73 | 2.63 | 8.01 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 459.62 | 460.14 | 459.85 | 460.31 | 460.10 | 459.75 | 460.00 | 459.75 | 459.81 | 460.00 | 460.00 | 460.33 | |
| MAXIMUM | 459.97 | 460.25 | 460.14 | 460.46 | 460.62 | 460.64 | 460.41 | 460.80 | 460.51 | 460.45 | 460.25 | 460.47 | |
| MINIMUM | 459.07 | 459.29 | 459.35 | 459.50 | 459.55 | 459.06 | 458.57 | 459.50 | 458.48 | 458.55 | 459.35 | 458.52 | |
| POOL CONTENT-EOM (1000AC.FT) | 509.31 | 532.00 | 519.22 | 539.67 | 530.20 | 514.91 | 525.69 | 514.91 | 517.50 | 525.69 | 525.69 | 540.58 | |



ARKANSAS RIVER BASIN

| W.D. MAYO LOCK AND DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1943 THRU 1981 | 1286.93 | 1308.95 | 1072.34 | 1000.13 | 1200.22 | 2018.50 | 2575.19 | 3157.14 | 2710.16 | 2122.46 | 974.74 | 1253.55 | 20680.3 |
| FY 1989 | 312.40 | 580.76 | 541.88 | 967.73 | 2627.70 | 2640.99 | 1714.51 | 1910.48 | 4624.07 | 1856.33 | 1401.52 | 2971.04 | 22149.4 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1779.50 | 1623.17 | 1581.68 | 1430.57 | 1453.90 | 3014.23 | 3194.91 | 2702.51 | 2970.37 | 1651.54 | 747.36 | 766.03 | 22915.8 |
| FY 1989 | 311.86 | 580.12 | 541.37 | 967.44 | 2627.74 | 2642.89 | 1711.69 | 1910.89 | 4623.65 | 1854.83 | 1400.05 | 2970.98 | 22143.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.39 | 3.32 | 2.71 | 2.24 | 2.80 | 3.65 | 4.46 | 5.53 | 4.32 | 3.16 | 2.99 | 4.09 | 42.66 |
| FY 1989 | 0.83 | 4.95 | 1.64 | 5.76 | 5.57 | 3.85 | 0.85 | 8.55 | 6.89 | 3.31 | 2.40 | 4.67 | 49.27 |
| DEVIATION | -2.56 | 1.63 | -1.07 | 3.52 | 2.77 | 0.20 | -3.61 | 3.02 | 2.57 | 0.15 | -0.59 | 0.58 | 6.61 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 412.65 | 412.81 | 412.91 | 412.91 | 412.73 | 411.20 | 412.70 | 412.04 | 411.87 | 412.45 | 412.84 | 412.54 | |
| MAXIMUM | 413.50 | 413.18 | 413.23 | 413.20 | 413.15 | 413.23 | 413.08 | 413.04 | 413.65 | 413.08 | 413.03 | 413.10 | |
| MINIMUM | 410.60 | 411.78 | 410.04 | 412.17 | 411.45 | 410.88 | 411.08 | 410.80 | 410.20 | 411.56 | 411.32 | 411.66 | |
| POOL CONTENT-EOM (1000AC.FT) | 15.21 | 15.47 | 15.63 | 15.63 | 15.34 | 13.05 | 15.29 | 14.24 | 14.00 | 14.89 | 15.51 | 15.04 | |

ARKANSAS RIVER BASIN

| WISTER LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1928 THRU 1981 | 18.76 | 50.47 | 65.96 | 67.53 | 93.38 | 126.43 | 132.44 | 134.46 | 60.21 | 21.41 | 9.21 | 17.46 | 797.7 |
| FY 1989 | 0.30 | 45.02 | 42.51 | 108.32 | 295.98 | 180.57 | 30.45 | 211.62 | 114.62 | 44.14 | 4.92 | 16.20 | 1094.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 16.42 | 38.19 | 104.64 | 81.89 | 84.49 | 123.51 | 90.38 | 103.30 | 98.62 | 18.16 | 6.15 | 4.25 | 770.0 |
| FY 1989 | 0.79 | 16.19 | 38.32 | 65.02 | 224.73 | 235.99 | 112.18 | 103.33 | 191.07 | 46.54 | 23.01 | 13.85 | 1071.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.43 | 3.56 | 3.15 | 2.71 | 3.13 | 4.00 | 4.65 | 5.87 | 4.08 | 3.55 | 3.28 | 4.16 | 45.60 |
| FY 1989 | 2.78 | 3.53 | 3.82 | 3.89 | 6.52 | 5.65 | 2.34 | 10.15 | 6.73 | 6.91 | 2.66 | 4.91 | 59.89 |
| DEVIATION | -0.65 | -0.03 | 0.67 | 1.18 | 3.36 | 1.65 | -2.31 | 4.28 | 2.65 | 3.36 | -0.62 | 0.75 | 14.29 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 474.35 | 478.69 | 479.12 | 483.65 | 489.34 | 484.87 | 474.81 | 486.52 | 478.51 | 477.85 | 474.54 | 474.70 | |
| MAXIMUM | 474.69 | 480.06 | 479.48 | 483.79 | 493.99 | 489.34 | 484.96 | 489.43 | 489.95 | 479.82 | 477.88 | 475.51 | |
| MINIMUM | 474.35 | 474.21 | 476.68 | 474.61 | 476.24 | 474.49 | 474.60 | 474.81 | 478.38 | 477.82 | 474.54 | 474.54 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 39.79 | 67.62 | 70.98 | 113.32 | 183.96 | 126.66 | 42.23 | 146.40 | 66.25 | 61.31 | 40.80 | 41.65 | |

| JAMES W. TRIMBLE L & D | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 1876.5 | 2366.3 | 2172.1 | 1843.5 | 1893.1 | 3604.7 | 3483.5 | 3205.3 | 3338.1 | 1603.4 | 738.0 | 855.7 | 26980.2 |
| WY 1989 | 276.5 | 563.2 | 559.0 | 1101.9 | 3239.3 | 2991.9 | 1667.4 | 2154.6 | 4809.2 | 1878.5 | 1400.0 | 3129.3 | 23770.8 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1972 thru 1989 | 3.9 | 4.9 | 3.0 | 1.8 | 2.7 | 4.5 | 3.3 | 4.6 | 3.7 | 3.1 | 2.6 | 3.5 | 41.6 |
| WY 1989 | 1.4 | 5.5 | .9 | 4.2 | 6.2 | 4.5 | .5 | 9.1 | 4.7 | 3.8 | 3.5 | 4.1 | 48.4 |
| Deviation | -2.5 | .6 | -2.1 | 2.4 | 3.5 | .0 | -2.8 | 4.5 | 1.0 | .7 | .9 | .6 | 6.8 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 391.94 | 391.68 | 392.24 | 391.93 | 391.63 | 389.82 | 391.98 | 391.81 | 390.94 | 392.18 | 391.57 | 391.80 | |
| Maximum | 392.97 | 392.63 | 392.34 | 392.72 | 392.03 | 392.24 | 392.26 | 392.43 | 392.04 | 392.26 | 392.32 | 392.09 | |
| Minimum | 391.42 | 391.64 | 391.59 | 390.29 | 388.94 | 389.37 | 389.82 | 389.58 | 388.61 | 390.94 | 391.29 | 388.95 | |
| Pool Content EOM (1,000 AC. FT.) | 58.7 | 57.0 | 60.8 | 58.6 | 56.7 | 45.4 | 59.0 | 57.8 | 52.0 | 60.4 | 56.3 | 57.8 | |

| OZARK-JETA TAYLOR LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1972 thru 1989 | 1924.1 | 2618.9 | 2506.7 | 1965.8 | 2106.9 | 4037.3 | 3901.5 | 3493.0 | 3536.4 | 1682.4 | 780.8 | 894.7 | 29448.5 |
| WY 1989 | 307.6 | 710.7 | 640.4 | 1316.5 | 3741.4 | 3433.4 | 1934.8 | 2431.8 | 4984.3 | 1976.1 | 1494.2 | 3238.1 | 26209.3 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1973 thru 1989 | 3.9 | 5.2 | 3.7 | 2.0 | 2.9 | 4.5 | 3.1 | 5.3 | 4.2 | 3.2 | 2.4 | 3.6 | 44.0 |
| WY 1989 | 2.1 | 6.2 | 1.5 | 2.9 | 3.7 | 3.0 | .4 | 7.3 | 6.6 | 3.9 | .5 | 3.4 | 41.5 |
| Deviation | -1.8 | 1.0 | -2.2 | .9 | .8 | -1.5 | -2.7 | 2.0 | 2.4 | .7 | -1.9 | -.2 | -2.5 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 371.72 | 371.25 | 272.53 | 371.90 | 371.75 | 371.37 | 371.68 | 371.59 | 371.87 | 371.57 | 370.63 | 372.20 | |
| Maximum | 372.21 | 372.17 | 373.46 | 373.20 | 372.50 | 372.59 | 372.50 | 371.97 | 372.54 | 372.53 | 372.49 | 372.56 | |
| Minimum | 371.05 | 370.41 | 370.88 | 370.03 | 371.03 | 370.68 | 371.01 | 370.89 | 370.22 | 370.13 | 370.50 | 370.60 | |
| Pool Content EOM (1,000 AC. FT.) | 145.7 | 141.1 | 154.6 | 147.4 | 146.0 | 142.3 | 145.3 | 144.4 | 147.1 | 144.2 | 135.1 | 150.7 | |

| DARDANELLE LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 1759.3 | 2298.8 | 2317.4 | 1900.6 | 2048.7 | 3488.6 | 3626.5 | 3447.2 | 3623.4 | 1632.6 | 842.1 | 885.5 | 27670.7 |
| WY 1989 | 298.2 | 881.8 | 750.5 | 1504.4 | 4185.7 | 3553.6 | 1975.9 | 2485.7 | 4913.5 | 2002.9 | 1493.8 | 3184.9 | 27230.9 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.5 | 5.0 | 4.5 | 2.3 | 3.3 | 4.9 | 3.9 | 5.5 | 4.1 | 2.7 | 2.7 | 3.7 | 47.1 |
| WY 1989 | 3.4 | 8.3 | 1.9 | 2.5 | 6.1 | 3.6 | .8 | 5.2 | 3.9 | 3.9 | .8 | 3.1 | 43.5 |
| Deviation | -1.1 | 3.3 | -2.6 | .2 | 2.8 | -1.3 | -3.1 | -.3 | -.2 | 1.2 | -1.9 | -.6 | -3.6 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 337.72 | 338.02 | 337.36 | 337.97 | 338.02 | 337.87 | 337.47 | 337.83 | 337.94 | 338.13 | 337.85 | 337.72 | |
| Maximum | 338.11 | 338.40 | 338.20 | 338.30 | 338.30 | 338.38 | 338.15 | 338.30 | 338.17 | 338.46 | 338.24 | 338.36 | |
| Minimum | 337.28 | 337.06 | 337.00 | 337.29 | 336.98 | 336.73 | 336.77 | 337.37 | 336.89 | 337.24 | 337.18 | 337.17 | |
| Pool Content EOM (1,000 AC. FT.) | 476.8 | 486.9 | 464.8 | 485.2 | 486.9 | 481.8 | 468.4 | 480.5 | 484.2 | 490.8 | 481.2 | 476.8 | |

| BLUE MOUNTAIN LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1948 thru 1989 | 11.4 | 24.7 | 36.7 | 42.0 | 49.1 | 63.4 | 54.6 | 54.9 | 17.0 | 10.3 | 4.8 | 4.6 | 373.5 |
| WY 1989 | .4 | 32.9 | 17.2 | 52.2 | 169.7 | 71.2 | 25.0 | 96.4 | 39.4 | 24.3 | 1.0 | 2.0 | 531.7 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1948 thru 1989 | 5.4 | 14.5 | 35.8 | 40.1 | 44.2 | 50.5 | 46.1 | 50.1 | 37.3 | 17.3 | 10.9 | 6.2 | 358.4 |
| WY 1989 | .3 | 4.6 | 17.9 | 32.8 | 88.4 | 95.4 | 90.4 | 44.1 | 93.0 | 26.7 | 2.2 | 4.5 | 500.3 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1948 thru 1989 | 3.5 | 3.9 | 3.5 | 2.5 | 3.1 | 4.0 | 4.1 | 5.4 | 3.6 | 4.0 | 3.3 | 3.5 | 44.4 |
| WY 1989 | 2.0 | 8.7 | 2.5 | 3.6 | 7.6 | 3.9 | 2.2 | 9.0 | 4.8 | 6.5 | 1.5 | 3.3 | 55.6 |
| Deviation | -1.5 | 4.8 | -1.0 | 1.1 | 4.5 | -.1 | -1.9 | 3.6 | 1.2 | 2.5 | -1.8 | -.2 | 11.2 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 370.85 | 385.87 | 385.59 | 390.99 | 405.21 | 401.65 | 388.01 | 399.13 | 386.81 | 385.75 | 385.01 | 384.01 | |
| Maximum | 370.95 | 386.41 | 385.87 | 391.23 | 408.39 | 405.47 | 401.65 | 399.81 | 400.03 | 389.51 | 385.75 | 385.01 | |
| Minimum | 370.73 | 370.80 | 384.01 | 384.07 | 387.13 | 399.71 | 388.01 | 386.99 | 386.81 | 385.75 | 385.01 | 383.91 | |
| Pool Content EOM (1,000 AC. FT.) | 2.2 | 30.4 | 29.5 | 48.8 | 129.7 | 104.2 | 37.5 | 88.[illegible] | 33.5 | 30.0 | 27.7 | 24.7 | |

| ARTHUR V. ORMOND L & D | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 1992.9 | 2679.8 | 3008.9 | 2174.8 | 2250.2 | 4031.1 | 4078.2 | 3693.8 | 3573.4 | 1651.8 | 792.4 | 932.4 | 30859.7 |
| WY 1989 | 312.5 | 1010.9 | 775.3 | 1618.7 | 4750.3 | 3878.7 | 2137.7 | 2531.5 | 5117.7 | 1952.4 | 1243.5 | 2994.9 | 28324.1 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.0 | 5.2 | 4.6 | 2.3 | 3.2 | 4.3 | 3.8 | 4.8 | 4.2 | 2.8 | 2.8 | 3.6 | 45.6 |
| WY 1989 | 3.3 | 7.9 | 2.2 | 2.7 | 7.6 | 5.1 | .8 | 5.1 | 4.0 | 6.9 | 1.6 | 3.5 | 50.7 |
| Deviation | -.7 | 2.7 | -2.4 | .4 | 4.4 | .8 | -3.0 | .3 | -.2 | 4.1 | -1.2 | -.1 | 5.1 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 285.41 | 286.73 | 285.31 | 284.60 | 285.71 | 284.72 | 284.60 | 286.44 | 284.37 | 286.15 | 286.64 | 284.19 | |
| Maximum | 286.95 | 287.00 | 287.17 | 287.09 | 290.28 | 287.08 | 287.22 | 286.89 | 287.06 | 286.72 | 287.02 | 286.95 | |
| Minimum | 284.52 | 284.17 | 284.90 | 284.35 | 283.99 | 283.94 | 284.04 | 284.00 | 284.05 | 283.57 | 284.03 | 283.96 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 56.0 | 63.1 | 55.5 | 51.9 | 57.6 | 52.5 | 51.9 | 61.5 | 50.7 | 59.9 | 62.6 | 49.8 | |

| TOAD SUCK FERRY L & D | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 1924.1 | 2736.1 | 2837.4 | 2344.3 | 2402.8 | 4258.8 | 4269.8 | 3799.7 | 3638.5 | 2053.7 | 792.4 | 936.8 | 31994.4 |
| WY 1989 | 351.5 | 1232.5 | 837.7 | 1675.1 | 5099.2 | 3852.8 | 2296.4 | 2600.0 | 5068.1 | 1809.5 | 1107.2 | 2776.8 | 28706.8 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.1 | 5.5 | 4.7 | 2.4 | 3.2 | 4.4 | 4.2 | 4.9 | 4.4 | 2.5 | 2.6 | 3.4 | 46.3 |
| WY 1989 | 4.4 | 5.5 | .5 | 1.7 | 3.5 | 2.4 | .5 | 4.6 | 3.7 | 4.4 | 1.3 | 3.1 | 35.6 |
| Deviation | .3 | .0 | -4.2 | -.7 | .3 | -2.0 | -3.7 | -.3 | -.7 | 1.9 | -1.3 | -.3 | -10.7 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 265.26 | 265.31 | 264.88 | 264.63 | 264.89 | 268.52 | 265.05 | 264.84 | 265.04 | 265.33 | 265.31 | 264.78 | |
| Maximum | 265.60 | 265.58 | 265.54 | 265.75 | 274.29 | 268.52 | 268.52 | 265.70 | 268.98 | 265.67 | 265.70 | 265.49 | |
| Minimum | 264.85 | 264.39 | 264.87 | 264.47 | 264.35 | 264.12 | 264.36 | 264.26 | 264.13 | 264.68 | 264.80 | 264.10 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 34.1 | 34.3 | 32.5 | 31.5 | 32.6 | 55.9 | 33.2 | 32.4 | 33.2 | 34.4 | 34.3 | 32.1 | |

| NIMROD LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1944 thru 1989 | 18.6 | 41.6 | 71.5 | 65.3 | 88.8 | 102.7 | 88.6 | 93.3 | 37.7 | 13.0 | 5.8 | 6.7 | 633.6 |
| WY 1989 | .1 | 99.5 | 37.5 | 84.7 | 222.8 | 117.2 | 34.7 | 95.2 | 87.1 | 38.9 | 2.7 | 6.0 | 826.4 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1944 thru 1989 | 9.4 | 30.8 | 67.6 | 68.0 | 77.5 | 97.1 | 94.0 | 93.6 | 51.6 | 24.0 | 10.4 | 9.0 | 633.0 |
| WY 1989 | .8 | 39.2 | 83.2 | 69.7 | 140.5 | 174.1 | 71.1 | 81.0 | 100.3 | 42.4 | 3.8 | 8.4 | 814.5 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1944 thru 1989 | 3.8 | 4.1 | 4.0 | 3.0 | 3.6 | 4.9 | 4.6 | 5.8 | 4.1 | 4.0 | 3.1 | 3.7 | 48.7 |
| WY 1989 | 2.9 | 9.2 | 3.1 | 4.0 | 6.9 | 4.4 | 3.0 | 7.0 | 6.1 | 7.0 | 1.5 | 4.6 | 59.7 |
| Deviation | -.9 | 5.1 | -.9 | 1.0 | 3.3 | -.5 | -1.6 | 1.2 | 2.0 | 3.0 | -1.6 | .9 | 11.0 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 341.55 | 352.72 | 345.06 | 347.90 | 358.62 | 351.66 | 345.16 | 347.62 | 344.68 | 343.55 | 342.94 | 342.08 | |
| Maximum | 342.37 | 353.90 | 352.72 | 348.16 | 361.88 | 358.62 | 351.86 | 350.34 | 352.82 | 347.70 | 343.60 | 343.16 | |
| Minimum | 341.55 | 341.34 | 342.00 | 342.00 | 343.24 | 345.06 | 344.98 | 344.99 | 344.68 | 343.55 | 342.94 | 342.04 | |
| Pool Content EOM (1,000 AC. FT.) | 27.4 | 87.3 | 41.3 | 56.0 | 137.8 | 79.7 | 41.8 | 54.4 | 39.7 | 34.9 | 32.3 | 29.3 | |

| MURRAY LOCK AND DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 2031.4 | 2783.1 | 3109.9 | 2437.5 | 2522.4 | 4412.0 | 4475.7 | 4120.8 | 3730.0 | 1660.9 | 751.6 | 920.8 | 32956.1 |
| WY 1989 | 320.2 | 1403.3 | 942.9 | 1881.7 | 5392.3 | 4213.4 | 2523.2 | 2799.0 | 5167.4 | 2163.2 | 1192.9 | 2933.9 | 30933.4 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 3.7 | 6.0 | 4.7 | 2.7 | 3.4 | 4.4 | 4.9 | 5.1 | 3.7 | 2.8 | 2.3 | 3.5 | 47.2 |
| WY 1989 | 2.6 | 13.6 | 2.9 | 2.0 | 8.7 | 7.6 | 2.4 | 5.8 | 5.3 | 6.1 | .5 | 5.3 | 62.8 |
| Deviation | -1.1 | 7.6 | -1.8 | -.7 | 5.3 | 3.2 | -2.5 | .7 | 1.6 | 3.3 | -1.8 | 1.8 | 15.6 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 250.32 | 250.18 | 248.93 | 248.65 | 248.84 | 248.02 | 249.93 | 248.60 | 248.72 | 249.15 | 248.89 | 249.10 | |
| Maximum | 250.54 | 250.51 | 250.62 | 250.71 | 249.45 | 249.18 | 250.48 | 250.09 | 249.13 | 249.38 | 249.33 | 249.12 | |
| Minimum | 250.15 | 248.56 | 248.93 | 248.35 | 246.36 | 247.33 | 247.52 | 247.87 | 247.04 | 248.58 | 248.64 | 248.19 | |
| Pool Content EOM (1,000 AC. FT.) | 101.0 | 99.4 | 86.5 | 83.9 | 85.6 | 78.2 | 96.7 | 83.5 | 84.6 | 88.6 | 86.1 | 88.1 | |

| DAVID D. TERRY L & D | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1969 thru 1989 | 1945.6 | 2681.0 | 3179.5 | 2592.0 | 2691.1 | 4465.1 | 4549.3 | 4159.2 | 3796.9 | 1758.3 | 792.1 | 914.4 | 33524.5 |
| WY 1989 | 314.9 | 1420.8 | 934.6 | 1774.3 | 5396.2 | 4211.3 | 2444.3 | 2662.7 | 5023.2 | 1984.1 | 1200.3 | 2775.7 | 30142.4 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.1 | 5.0 | 4.3 | 3.1 | 3.0 | 4.2 | 4.5 | 4.9 | 3.7 | 3.1 | 2.3 | 3.0 | 45.2 |
| WY 1989 | 1.7 | 3.8 | .6 | 1.2 | 3.0 | 5.6 | 1.4 | 2.4 | 1.7 | 4.7 | 1.2 | 2.5 | 29.8 |
| Deviation | -2.4 | -1.2 | -3.7 | -1.9 | .0 | 1.4 | -3.1 | -2.5 | -2.0 | 1.6 | -1.1 | -.5 | -15.4 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 231.18 | 230.82 | 230.78 | 230.10 | 230.66 | 230.37 | 230.83 | 230.40 | 230.05 | 230.79 | 231.11 | 231.01 | |
| Maximum | 231.60 | 231.67 | 231.38 | 231.37 | 232.57 | 231.11 | 231.34 | 231.25 | 231.38 | 231.38 | 231.68 | 231.62 | |
| Minimum | 230.74 | 230.08 | 230.20 | 229.38 | 228.96 | 229.59 | 229.53 | 229.68 | 228.93 | 229.69 | 230.26 | 230.31 | |
| Pool Content EOM (1,000 AC. FT.) | 50.3 | 48.8 | 48.7 | 46.1 | 48.2 | 47.1 | 48.9 | 47.2 | 45.9 | 48.7 | 50.0 | 49.5 | |

| LOCK AND DAM NO. 5 | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 2044.3 | 2823.5 | 3098.4 | 2530.3 | 2511.6 | 4441.5 | 4563.0 | 4117.0 | 3817.7 | 1738.7 | 802.9 | 969.0 | 33457.9 |
| WY 1989 | 320.6 | 1547.4 | 1055.9 | 2036.7 | 5583.2 | 4240.5 | 2571.3 | 2866.7 | 5519.5 | 2301.4 | 1382.7 | 3029.1 | 32455.0 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1972 thru 1989 | 4.2 | 4.9 | 4.7 | 2.8 | 3.3 | 4.2 | 4.6 | 5.3 | 3.5 | 3.3 | 2.6 | 3.4 | 46.8 |
| WY 1989 | 2.2 | 3.6 | 1.4 | 2.1 | 2.5 | 2.4 | 2.3 | 2.2 | 2.7 | 6.0 | 2.3 | 3.1 | 32.8 |
| Deviation | -2.0 | -1.3 | -3.3 | -.7 | -.8 | -1.8 | -2.3 | -3.1 | -.8 | 2.7 | -.3 | -.3 | -14.0 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 213.28 | 213.12 | 213.00 | 212.13 | 212.86 | 212.28 | 213.03 | 212.56 | 212.21 | 213.23 | 213.21 | 213.27 | |
| Maximum | 213.89 | 213.50 | 213.65 | 213.53 | 213.61 | 213.30 | 213.42 | 213.53 | 213.42 | 213.74 | 213.81 | 213.42 | |
| Minimum | 213.07 | 212.17 | 212.77 | 212.13 | 210.11 | 211.61 | 211.57 | 212.04 | 211.02 | 212.18 | 212.66 | 212.12 | |
| Pool Content EOM (1,000 AC. FT.) | 63.3 | 62.2 | 61.3 | 55.7 | 60.4 | 56.7 | 61.5 | 58.5 | 56.2 | 63.0 | 62.8 | 63.2 | |

LITTLE ROCK DISTRICT
ARKANSAS RIVER BASIN

| LOCK AND DAM NO. 4 | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 2055.7 | 2881.3 | 3159.4 | 2586.2 | 4177.9 | 4584.1 | 4776.4 | 4265.3 | 3940.2 | 1758.4 | 730.6 | 965.5 | 35081.0 |
| WY 1989 | 310.1 | 1588.5 | 1125.6 | 2049.4 | 5692.7 | 4701.9 | 2835.3 | 2842.8 | 5400.0 | 2354.1 | 135.4 | 3145.1 | 32180.9 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1972 thru 1989 | 4.2 | 5.5 | 5.3 | 3.5 | 3.8 | 4.4 | 4.1 | 5.3 | 3.6 | 3.7 | 2.5 | 3.6 | 49.5 |
| WY 1989 | 3.9 | 9.1 | 3.7 | 5.1 | 8.8 | 5.5 | 1.9 | 3.6 | 7.9 | 6.2 | .0 | .6 | 56.3 |
| Deviation | -.3 | 3.6 | -1.6 | 1.6 | 5.0 | 1.1 | -2.2 | -1.7 | 4.3 | 2.5 | -2.5 | -3.0 | 6.8 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 196.22 | 195.99 | 196.10 | 195.46 | 195.57 | 195.73 | 196.26 | 195.77 | 195.86 | 196.40 | 196.13 | 196.19 | |
| Maximum | 196.69 | 196.62 | 196.45 | 196.44 | 196.95 | 196.16 | 196.60 | 196.56 | 196.22 | 196.46 | 196.55 | 196.41 | |
| Minimum | 195.78 | 195.35 | 195.61 | 195.21 | 194.02 | 194.95 | 195.28 | 195.32 | 194.10 | 195.37 | 195.90 | 195.37 | |
| Pool Content EOM (1,000 AC. FT.) | 71.9 | 70.3 | 71.1 | 67.5 | 68.1 | 68.9 | 72.1 | 69.2 | 69.6 | 73.0 | 71.3 | 71.7 | |

| LOCK AND DAM NO. 3 | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 2069.5 | 2910.8 | 3214.3 | 2600.7 | 2703.4 | 4634.2 | 4883.4 | 4393.8 | 4020.7 | 1771.6 | 770.0 | 950.4 | 34922.8 |
| WY 1989 | 283.9 | 1576.9 | 1170.3 | 2023.9 | 5808.5 | 4835.8 | 3058.6 | 2963.0 | 6011.1 | 2527.6 | 1333.2 | 3111.7 | 34704.5 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.0 | 5.2 | 4.7 | 3.7 | 3.5 | 4.5 | 4.1 | 5.0 | 3.7 | 3.4 | 2.8 | 3.4 | 48.0 |
| WY 1989 | 4.8 | 7.1 | 2.7 | 5.1 | 8.3 | 6.8 | 2.4 | 4.8 | 6.5 | 8.9 | .1 | 3.5 | 61.0 |
| Deviation | .8 | 1.9 | -2.0 | 1.4 | 4.8 | 2.3 | -1.7 | -.2 | 2.8 | 5.5 | -2.7 | .1 | 13.0 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 182.03 | 182.23 | 181.84 | 181.46 | 181.71 | 182.18 | 182.21 | 181.44 | 181.50 | 181.82 | 182.09 | 182.20 | |
| Maximum | 182.44 | 182.55 | 182.47 | 182.50 | 184.95 | 182.22 | 182.47 | 182.44 | 182.99 | 182.36 | 182.47 | 182.44 | |
| Minimum | 181.72 | 181.25 | 181.53 | 180.74 | 180.20 | 180.38 | 180.45 | 180.85 | 180.25 | 181.39 | 181.52 | 181.19 | |
| Pool Content EOM (1,000 AC. FT.) | 46.5 | 47.3 | 45.8 | 44.3 | 45.3 | 47.1 | 47.2 | 44.2 | 44.5 | 45.7 | 46.8 | 47.2 | |

| WILBUR D. MILLS DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 1969.9 | 2946.3 | 3415.6 | 2675.0 | 2790.0 | 4780.2 | 5024.9 | 4090.9 | 4003.1 | 1768.9 | 777.3 | 1448.3 | 35690.4 |
| WY 1989 | 273.8 | 1493.1 | 1304.2 | 2177.7 | 6069.0 | 5090.5 | 3158.6 | 2776.9 | 5607.5 | 2447.0 | 1250.5 | 3127.4 | 34776.2 |
| Project Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 4.4 | 5.8 | 5.4 | 4.4 | 4.4 | 5.9 | 4.5 | 5.0 | 4.1 | 3.6 | 3.0 | 3.6 | 54.1 |
| WY 1989 | 2.8 | 5.7 | 5.6 | 6.5 | 6.9 | 4.3 | 1.0 | 5.0 | 11.5 | 10.6 | 2.9 | 2.9 | 65.7 |
| Deviation | -1.6 | -.1 | .2 | 2.1 | 2.5 | -1.6 | -3.5 | .0 | 7.4 | 7.0 | -.1 | -.7 | 11.6 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 162.32 | 162.36 | 161.57 | 162.03 | 161.55 | 161.22 | 163.30 | 161.62 | 161.15 | 162.28 | 161.93 | 162.12 | |
| Maximum | 162.51 | 162.37 | 162.39 | 162.46 | 162.93 | 162.15 | 163.63 | 163.30 | 162.05 | 162.37 | 162.39 | 162.81 | |
| Minimum | 161.98 | 161.38 | 161.57 | 161.37 | 160.83 | 161.12 | 160.68 | 161.03 | 160.52 | 161.04 | 161.93 | 161.25 | |
| Pool Content EOM (1,000 AC. FT.) | 113.7 | 114.1 | 105.5 | 110.4 | 105.3 | 101.8 | 124.8 | 106.0 | 101.0 | 113.2 | 109.4 | 111.4 | |

NORREL LOCK NO. 1 (No basic data collected)

| ALTUS LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1938 THRU 1981 | 7.13 | 2.75 | 3.44 | 3.77 | 5.05 | 5.93 | 9.57 | 29.65 | 20.95 | 8.39 | 3.01 | 3.01 | 102.7 |
| FY 1989 | 4.93 | 4.71 | 6.60 | 6.64 | 8.20 | 12.82 | 9.07 | 21.57 | 59.65 | 8.07 | 10.25 | 9.00 | 161.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 0.21 | 2.97 | 1.35 | 1.71 | 2.60 | 5.32 | 2.42 | 16.70 | 9.82 | 7.27 | 4.88 | 0.36 | 55.6 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.45 | 56.15 | 1.40 | 0.00 | 0.00 | 69.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.99 | 0.88 | 0.77 | 0.63 | 0.83 | 1.19 | 1.99 | 4.09 | 3.19 | 2.21 | 2.50 | 2.30 | 22.57 |
| FY 1989 | 0.54 | 0.43 | 0.12 | 0.57 | 0.64 | 1.41 | 0.44 | 3.77 | 6.27 | 1.44 | 3.63 | 2.24 | 21.50 |
| DEVIATION | -1.45 | -0.45 | -0.65 | -0.06 | -0.19 | 0.22 | -1.55 | -0.32 | 3.08 | -0.77 | 1.13 | -0.06 | -1.07 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1550.78 | 1551.50 | 1552.62 | 1553.73 | 1555.05 | 1556.95 | 1557.94 | 1559.04 | 1559.08 | 1554.93 | 1552.05 | 1552.32 | |
| MAXIMUM | 1550.78 | 1551.50 | 1552.62 | 1553.73 | 1555.05 | 1556.95 | 1557.94 | 1559.52 | 1560.03 | 1559.15 | 1554.93 | 1552.36 | |
| MINIMUM | 1550.02 | 1550.78 | 1551.50 | 1552.62 | 1553.73 | 1555.05 | 1556.95 | 1557.94 | 1559.04 | 1554.93 | 1552.05 | 1551.28 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 87.52 | 91.01 | 96.61 | 102.38 | 109.53 | 120.38 | 126.30 | 133.09 | 133.34 | 108.86 | 93.71 | 95.09 | |

| MOUNTAIN PARK DAM | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1981 | 1.51 | 0.45 | 0.36 | 0.25 | 0.33 | 0.66 | 1.38 | 5.73 | 4.07 | 1.28 | 0.73 | 1.77 | 18.5 |
| FY 1989 | 0.20 | 0.07 | 0.18 | 1.37 | 0.64 | 4.48 | 0.34 | 6.53 | 21.46 | 0.13 | 0.51 | 3.19 | 39.1 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1981 THRU 1989 | 1.01 | 2.38 | 0.62 | 0.00 | 1.22 | 1.67 | 0.23 | 2.74 | 3.60 | 0.59 | 0.00 | 0.00 | 14.1 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.80 | 0.87 | 0.00 | 0.00 | 9.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.49 | 1.35 | 1.14 | 1.03 | 1.18 | 1.55 | 2.43 | 4.82 | 3.37 | 2.15 | 2.26 | 2.87 | 26.64 |
| FY 1989 | 1.52 | 1.12 | 0.42 | 2.15 | 1.67 | 1.72 | 0.05 | 3.77 | 7.92 | 0.66 | 3.60 | 5.43 | 30.03 |
| DEVIATION | -0.97 | -0.23 | -0.72 | 1.12 | 0.49 | 0.17 | -2.38 | -1.05 | 4.55 | -1.49 | 1.34 | 2.56 | 3.39 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1409.93 | 1409.65 | 1409.43 | 1409.38 | 1409.28 | 1409.60 | 1409.07 | 1409.64 | 1411.16 | 1410.10 | 1409.59 | 1409.61 | |
| MAXIMUM | 1410.39 | 1409.93 | 1409.65 | 1409.52 | 1409.38 | 1409.60 | 1409.60 | 1409.95 | 1412.56 | 1411.16 | 1410.10 | 1409.92 | |
| MINIMUM | 1409.89 | 1409.65 | 1409.43 | 1409.35 | 1409.21 | 1409.03 | 1409.05 | 1408.93 | 1409.64 | 1410.10 | 1409.59 | 1409.38 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 82.29 | 80.63 | 79.33 | 79.04 | 78.45 | 80.34 | 77.21 | 80.57 | 90.01 | 83.33 | 80.28 | 80.40 | |



RED RIVER BASIN

| LAKE KEMP! | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1924 THRU 1981 | 22.20 | 5.94 | 6.74 | 3.73 | 5.59 | 7.68 | 12.78 | 38.02 | 25.28 | 15.57 | 18.91 | 27.01 | 189.4 |
| FY 1989 | 0.89 | 1.66 | 1.63 | 1.15 | 7.15 | 4.57 | 1.95 | 75.00 | 50.56 | 1.36 | 15.88 | 67.39 | 229.2 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 7.39 | 7.79 | 3.13 | 2.25 | 1.55 | 4.91 | 4.10 | 4.85 | 12.76 | 15.50 | 12.87 | 11.27 | 87.4 |
| FY 1989 | 1.35 | 2.28 | 0.78 | 6.17 | 0.00 | 0.00 | 6.29 | 2.22 | 0.07 | 14.79 | 5.86 | 33.62 | 73.4 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.41 | 1.08 | 0.98 | 0.83 | 1.00 | 1.10 | 1.88 | 3.66 | 2.73 | 1.99 | 2.22 | 2.92 | 22.80 |
| FY 1989 | 3.65 | 0.22 | 0.70 | 0.69 | 1.22 | 0.48 | 0.49 | 5.55 | 5.11 | 1.00 | 4.41 | 4.39 | 27.91 |
| DEVIATION | 1.24 | -0.86 | -0.28 | -0.14 | 0.22 | -0.62 | -1.39 | 1.89 | 2.38 | -0.99 | 2.19 | 1.47 | 5.11 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1136.85 | 1136.48 | 1136.41 | 1135.74 | 1136.30 | 1136.36 | 1135.28 | 1141.14 | 1144.04 | 1142.44 | 1142.47 | 1144.23 | |
| MAXIMUM | 1137.31 | 1136.86 | 1136.48 | 1136.44 | 1136.33 | 1136.44 | 1136.38 | 1141.26 | 1144.13 | 1144.04 | 1142.96 | 1145.92 | |
| MINIMUM | 1136.85 | 1136.48 | 1136.34 | 1135.59 | 1135.57 | 1136.25 | 1135.28 | 1134.97 | 1141.13 | 1142.44 | 1142.35 | 1141.77 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 174.53 | 170.90 | 170.22 | 163.86 | 169.14 | 169.73 | 159.72 | 226.16 | 268.64 | 244.62 | 245.06 | 271.66 | |

| WAURIKA LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1925 THRU 1981 | 7.81 | 4.14 | 3.26 | 1.71 | 3.76 | 5.22 | 7.51 | 26.25 | 17.73 | 3.32 | 1.70 | 4.28 | 86.7 |
| FY 1989 | 0.13 | 1.38 | 2.54 | 4.47 | 11.98 | 11.56 | 1.87 | 9.15 | 111.87 | 5.70 | 2.65 | 16.94 | 180.2 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1983 THRU 1989 | 14.90 | 20.90 | 7.47 | 13.81 | 7.67 | 28.80 | 15.62 | 11.39 | 39.16 | 10.79 | 0.18 | 3.14 | 173.8 |
| FY 1989 | 0.03 | 0.00 | 0.00 | 0.00 | 1.82 | 7.95 | 1.46 | 0.25 | 70.17 | 32.54 | 0.25 | 9.87 | 124.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.92 | 1.79 | 1.47 | 1.30 | 1.47 | 1.94 | 2.75 | 5.21 | 3.61 | 2.31 | 2.36 | 3.26 | 30.39 |
| FY 1989 | 1.70 | 0.57 | 1.63 | 2.00 | 3.17 | 1.30 | 0.18 | 3.91 | 9.40 | 2.55 | 2.89 | 5.75 | 35.05 |
| DEVIATION | -1.22 | -1.22 | 0.16 | 0.70 | 1.70 | -0.64 | -2.57 | -1.30 | 5.79 | 0.24 | 0.53 | 2.49 | 4.66 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 950.57 | 950.44 | 950.52 | 950.74 | 951.56 | 951.55 | 951.09 | 951.41 | 954.57 | 951.59 | 951.25 | 951.45 | |
| MAXIMUM | 951.01 | 950.79 | 950.67 | 950.76 | 951.79 | 952.08 | 951.55 | 951.65 | 959.55 | 954.57 | 951.68 | 952.57 | |
| MINIMUM | 950.51 | 950.42 | 950.42 | 950.49 | 950.56 | 951.47 | 951.08 | 950.99 | 951.41 | 951.52 | 951.25 | 951.12 | |
| POOL CONTENT-EOM (1000AC.FT) | 194.43 | 193.07 | 193.91 | 196.19 | 204.72 | 204.62 | 199.83 | 203.16 | 238.33 | 205.04 | 201.50 | 203.58 | |



RED RIVER BASIN

| FOSS RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1980 | 3.53 | 1.79 | 1.23 | 1.31 | 1.79 | 2.86 | 9.34 | 15.36 | 12.37 | 3.69 | 3.11 | 2.87 | 59.3 |
| FY 1989 | 0.23 | 4.66 | 0.50 | 6.05 | 3.21 | 9.23 | 4.37 | 20.58 | 43.45 | 3.36 | 9.64 | 2.62 | 107.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1978 THRU 1989 | 1.32 | 0.93 | 0.53 | 1.81 | 1.59 | 2.13 | 2.61 | 4.07 | 8.49 | 5.66 | 1.93 | 1.31 | 32.4 |
| FY 1989 | 0.61 | 0.59 | 0.61 | 0.61 | 0.55 | 0.66 | 3.57 | 6.48 | 11.29 | 32.16 | 6.58 | 10.96 | 74.7 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 1.92 | 1.06 | 0.74 | 0.57 | 0.80 | 1.13 | 1.73 | 3.66 | 3.06 | 2.44 | 2.45 | 1.82 | 21.38 |
| FY 1989 | 1.15 | 0.61 | 0.09 | 0.72 | 0.82 | 2.35 | 0.85 | 4.10 | 7.43 | 2.22 | 3.09 | 2.40 | 25.83 |
| DEVIATION | -0.77 | -0.45 | -0.65 | 0.15 | 0.02 | 1.22 | -0.88 | 0.44 | 4.37 | -0.22 | 0.64 | 0.58 | 4.45 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1639.53 | 1639.92 | 1639.65 | 1640.32 | 1640.56 | 1641.52 | 1641.14 | 1642.73 | 1646.53 | 1641.77 | 1641.78 | 1640.05 | |
| MAXIMUM | 1639.97 | 1639.92 | 1639.92 | 1640.32 | 1640.56 | 1641.52 | 1641.68 | 1643.18 | 1647.35 | 1646.53 | 1641.86 | 1641.78 | |
| MINIMUM | 1639.45 | 1639.48 | 1639.65 | 1639.64 | 1640.12 | 1640.42 | 1641.14 | 1640.99 | 1642.73 | 1641.77 | 1641.15 | 1640.05 | |
| POOL CONTENT-EOM (1000AC.FT) | 161.77 | 164.24 | 162.53 | 166.81 | 168.37 | 174.69 | 172.16 | 182.94 | 210.86 | 176.36 | 176.43 | 165.06 | |

RED RIVER BASIN

| FORT COBB RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1981 | 2.94 | 1.88 | 2.05 | 2.27 | 2.38 | 3.09 | 4.10 | 6.26 | 5.89 | 2.86 | 1.85 | 2.41 | 38.0 |
| FY 1989 | 1.63 | 3.91 | 2.36 | 3.11 | 3.17 | 4.07 | 2.74 | 8.28 | 40.80 | 1.90 | 2.06 | 5.98 | 80.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1.66 | 2.38 | 0.26 | 0.77 | 0.62 | 1.39 | 0.50 | 0.99 | 8.20 | 1.79 | 0.13 | 0.48 | 19.2 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.24 | 1.24 | 5.52 | 19.98 | 14.00 | 0.00 | 4.07 | 48.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.37 | 1.39 | 1.18 | 1.00 | 1.12 | 1.62 | 2.64 | 4.78 | 3.67 | 2.28 | 2.47 | 3.07 | 27.59 |
| FY 1989 | 1.87 | 1.89 | 1.20 | 2.04 | 1.60 | 2.06 | 0.67 | 5.11 | 12.48 | 1.40 | 3.79 | 4.95 | 39.06 |
| DEVIATION | -0.50 | 0.50 | 0.02 | 1.04 | 0.48 | 0.44 | -1.97 | 0.33 | 8.81 | -0.88 | 1.32 | 1.88 | 11.47 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 1341.29 | 1341.78 | 1341.87 | 1342.21 | 1342.60 | 1342.20 | 1341.84 | 1341.84 | 1345.92 | 1342.36 | 1342.16 | 1341.95 | |
| MAXIMUM | 1341.43 | 1341.79 | 1341.87 | 1342.21 | 1342.60 | 1342.60 | 1342.20 | 1343.18 | 1349.89 | 1345.92 | 1342.37 | 1343.11 | |
| MINIMUM | 1341.24 | 1341.23 | 1341.78 | 1341.87 | 1342.16 | 1342.00 | 1341.84 | 1341.64 | 1341.84 | 1342.31 | 1342.16 | 1341.95 | |
| POOL CONTENT-EOM (1000AC.FT) | 77.15 | 79.12 | 79.49 | 80.88 | 82.50 | 80.84 | 79.36 | 79.36 | 97.10 | 81.51 | 80.68 | 79.81 | |



RED RIVER BASIN

| ARBUCKLE RESERVOIR | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1981 | 3.80 | 3.24 | 3.29 | 3.07 | 4.90 | 5.63 | 8.07 | 12.49 | 7.59 | 2.94 | 2.12 | 3.74 | 60.9 |
| FY 1989 | 0.25 | 0.47 | 1.05 | 0.62 | 6.73 | 7.98 | 3.00 | 8.45 | 10.03 | 4.79 | 1.03 | 7.81 | 52.2 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 1.32 | 0.65 | 3.14 | 2.80 | 2.63 | 4.82 | 4.81 | 8.83 | 8.94 | 0.47 | 0.21 | 0.66 | 39.3 |
| FY 1989 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 1.86 | 2.19 | 6.79 | 8.25 | 1.56 | 0.06 | 6.25 | 27.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.48 | 2.33 | 2.06 | 1.75 | 2.21 | 2.92 | 3.86 | 5.65 | 3.90 | 2.48 | 2.78 | 3.75 | 37.17 |
| FY 1989 | 2.52 | 1.52 | 2.89 | 1.50 | 3.21 | 3.18 | 0.47 | 6.11 | 5.98 | 6.34 | 1.75 | 6.28 | 41.75 |
| DEVIATION | -0.96 | -0.81 | 0.83 | -0.25 | 1.00 | 0.26 | -3.39 | 0.46 | 2.08 | 3.86 | -1.03 | 2.53 | 4.58 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 868.92 | 868.51 | 868.41 | 868.14 | 870.64 | 872.57 | 872.14 | 872.05 | 871.97 | 872.44 | 871.96 | 871.84 | |
| MAXIMUM | 869.52 | 868.92 | 868.54 | 868.41 | 870.64 | 872.67 | 872.57 | 873.61 | 873.52 | 872.83 | 872.44 | 873.71 | |
| MINIMUM | 868.88 | 868.51 | 868.39 | 868.11 | 867.92 | 870.64 | 871.95 | 871.97 | 871.97 | 871.78 | 871.95 | 871.84 | |
| POOL CONTENT-EOM (1000AC.FT) | 65.40 | 64.51 | 64.29 | 63.71 | 69.26 | 73.76 | 72.73 | 72.52 | 72.33 | 73.45 | 72.31 | 72.03 | |

RED RIVER BASIN

| LAKE TEXOMA | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1906 THRU 1981 | 366.34 | 199.55 | 180.83 | 140.89 | 166.47 | 227.04 | 413.04 | 812.92 | 688.44 | 214.49 | 177.99 | 240.90 | 3828.9 |
| FY 1989 | 109.79 | 69.12 | 82.21 | 141.92 | 348.49 | 323.50 | 154.41 | 736.56 | 2380.56 | 344.53 | 116.93 | 606.94 | 5415.0 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 343.68 | 285.93 | 178.29 | 237.94 | 179.85 | 346.12 | 277.71 | 364.94 | 934.11 | 410.18 | 154.82 | 129.99 | 3843.6 |
| FY 1989 | 122.69 | 140.54 | 84.76 | 95.69 | 170.93 | 299.21 | 242.68 | 356.43 | 1558.10 | 1158.06 | 270.96 | 395.95 | 4896.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.49 | 1.39 | 1.22 | 1.13 | 1.28 | 1.64 | 2.48 | 4.39 | 3.30 | 2.20 | 2.33 | 2.89 | 26.74 |
| FY 1989 | 1.47 | 0.49 | 1.12 | 1.57 | 2.01 | 1.74 | 0.44 | 4.83 | 8.45 | 2.20 | 3.41 | 4.68 | 32.41 |
| DEVIATION | -1.02 | -0.90 | -0.10 | 0.44 | 0.73 | 0.10 | -2.04 | 0.44 | 5.15 | 0.00 | 1.08 | 1.79 | 5.67 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 615.11 | 613.93 | 613.72 | 614.13 | 616.21 | 616.09 | 614.52 | 618.49 | 626.10 | 617.51 | 615.25 | 617.34 | |
| MAXIMUM | 615.88 | 615.11 | 613.93 | 614.13 | 616.29 | 616.28 | 616.11 | 619.73 | 631.54 | 626.10 | 617.51 | 618.55 | |
| MINIMUM | 615.06 | 613.93 | 613.50 | 613.16 | 612.99 | 615.17 | 614.50 | 614.43 | 617.86 | 617.51 | 615.25 | 614.96 | |
| POOL CONTENT-EOM (1000AC.FT) | 2485.60 | 2393.46 | 2377.46 | 2408.94 | 2574.96 | 2564.58 | 2439.36 | 2778.48 | 3549.20 | 2689.20 | 2496.80 | 2673.90 | |



RED RIVER BASIN

| MCGEE CREEK | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1938 THRU 1976 | 5.37 | 6.61 | 5.69 | 4.84 | 10.14 | 11.89 | 18.50 | 17.98 | 10.32 | 4.03 | 1.97 | 4.72 | 102.1 |
| FY 1989 | 0.44 | 1.69 | 4.47 | 17.92 | 29.00 | 34.06 | 2.70 | 22.21 | 30.44 | 2.44 | 0.36 | 5.76 | 151.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1989 THRU 1989 | 0.68 | 0.60 | 0.66 | 5.93 | 32.00 | 23.21 | 14.24 | 17.49 | 32.41 | 0.65 | 0.68 | 4.53 | 133.1 |
| FY 1989 | 0.68 | 0.60 | 0.66 | 5.93 | 32.00 | 23.21 | 14.24 | 17.49 | 32.41 | 0.65 | 0.68 | 4.53 | 133.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 2.38 | 1.72 | 1.18 | 2.17 | 3.05 | 3.38 | 5.02 | 6.08 | 4.44 | 3.45 | 2.99 | 4.46 | 40.32 |
| FY 1989 | 4.47 | 6.83 | 3.38 | 3.56 | 4.63 | 5.52 | 1.57 | 5.57 | 7.94 | 6.72 | 7.72 | 8.04 | 65.95 |
| DEVIATION | 2.09 | 5.11 | 2.20 | 1.39 | 1.58 | 2.14 | -3.45 | -0.51 | 3.50 | 3.27 | 4.73 | 3.58 | 25.63 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 175.05 | 175.10 | 175.39 | 176.33 | 176.08 | 176.86 | 175.88 | 176.16 | 175.90 | 175.94 | 175.81 | 175.84 | |
| MAXIMUM | 175.12 | 175.11 | 175.39 | 176.50 | 177.56 | 177.05 | 176.86 | 176.58 | 177.70 | 175.99 | 175.94 | 176.19 | |
| MINIMUM | 175.01 | 175.01 | 175.08 | 175.39 | 175.89 | 175.88 | 175.87 | 175.87 | 175.90 | 175.88 | 175.81 | 175.77 | |
| POOL CONTENT-EOM (1000AC.FT) | 103.64 | 104.25 | 107.76 | 119.47 | 116.21 | 126.39 | 113.70 | 117.25 | 113.95 | 114.43 | 112.86 | 113.22 | |

| PAT MAYSE LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1937 THRU 1981 | 4.89 | 7.23 | 7.99 | 6.38 | 11.78 | 12.30 | 16.04 | 15.77 | 10.14 | 3.64 | 1.49 | 4.15 | 101.8 |
| FY 1989 | 0.63 | 2.33 | 2.26 | 6.11 | 28.40 | 23.40 | 2.57 | 39.38 | 54.38 | 11.81 | 1.81 | 4.80 | 177.9 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 0.26 | 2.73 | 5.83 | 3.93 | 7.27 | 12.95 | 9.70 | 10.85 | 14.50 | 5.74 | 0.75 | 0.15 | 74.6 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 0.00 | 8.64 | 13.19 | 13.88 | 24.74 | 49.74 | 18.25 | 3.64 | 2.13 | 134.2 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.55 | 3.39 | 3.21 | 2.76 | 3.09 | 3.74 | 4.71 | 5.30 | 4.01 | 3.28 | 2.62 | 4.19 | 43.85 |
| FY 1989 | 3.36 | 2.51 | 3.09 | 2.82 | 4.99 | 6.57 | 0.78 | 9.51 | 9.43 | 7.96 | 1.81 | 5.45 | 58.28 |
| DEVIATION | -0.19 | -0.88 | -0.12 | 0.06 | 1.90 | 2.83 | -3.93 | 4.21 | 5.42 | 4.68 | -0.81 | 1.26 | 14.43 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 448.70 | 448.75 | 448.79 | 449.60 | 452.65 | 453.90 | 451.61 | 453.50 | 453.71 | 452.16 | 451.30 | 451.30 | |
| MAXIMUM | 449.01 | 448.75 | 448.81 | 449.60 | 453.52 | 454.12 | 453.90 | 455.10 | 458.49 | 453.71 | 452.16 | 451.82 | |
| MINIMUM | 448.51 | 448.51 | 448.63 | 448.66 | 449.58 | 451.85 | 451.61 | 451.52 | 453.10 | 452.12 | 451.30 | 451.10 | |
| POOL CONTENT-EOM (1000AC.FT) | 111.15 | 111.43 | 111.64 | 116.28 | 134.63 | 142.56 | 128.22 | 140.00 | 141.34 | 131.59 | 126.33 | 126.33 | |



RED RIVER BASIN

| SARDIS LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1981 | 9.07 | 15.39 | 20.38 | 21.79 | 26.99 | 30.93 | 39.85 | 39.52 | 19.88 | 6.87 | 2.66 | 9.87 | 245.9 |
| FY 1989 | 0.25 | 5.35 | 11.70 | 31.50 | 58.29 | 67.04 | 13.09 | 34.12 | 69.24 | 11.33 | 3.77 | 10.87 | 316.5 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1985 THRU 1989 | 8.39 | 42.82 | 32.00 | 23.87 | 26.00 | 38.16 | 31.00 | 27.24 | 37.78 | 0.02 | 0.63 | 1.93 | 269.8 |
| FY 1989 | 0.00 | 0.00 | 0.00 | 6.52 | 70.10 | 40.43 | 36.26 | 25.48 | 67.28 | 0.09 | 3.15 | 9.65 | 259.0 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.44 | 3.40 | 2.78 | 2.50 | 3.01 | 3.63 | 4.78 | 6.03 | 4.34 | 3.54 | 3.28 | 4.57 | 45.30 |
| FY 1989 | 4.03 | 3.29 | 5.94 | 2.83 | 4.79 | 5.30 | 1.78 | 6.92 | 9.26 | 4.74 | 3.80 | 6.81 | 59.49 |
| DEVIATION | 0.59 | -0.11 | 3.16 | 0.33 | 1.78 | 1.67 | -3.00 | 0.89 | 4.92 | 1.20 | 0.52 | 2.24 | 14.19 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 597.73 | 597.95 | 598.71 | 600.38 | 599.45 | 601.08 | 598.99 | 599.26 | 599.02 | 599.44 | 599.03 | 598.82 | |
| MAXIMUM | 597.95 | 597.98 | 598.71 | 600.56 | 601.83 | 601.32 | 601.08 | 600.23 | 603.05 | 599.53 | 599.44 | 599.65 | |
| MINIMUM | 597.72 | 597.59 | 597.95 | 598.71 | 599.03 | 598.99 | 598.89 | 598.95 | 598.98 | 599.00 | 598.98 | 598.82 | |
| POOL CONTENT-EOM (1000AC.FT) | 257.45 | 260.30 | 270.45 | 293.65 | 280.57 | 303.70 | 274.20 | 277.94 | 274.61 | 280.44 | 274.75 | 271.92 | |

RED RIVER BASIN

| HUGO LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1926 THRU 1964 | 40.79 | 74.01 | 117.34 | 160.37 | 177.57 | 171.23 | 257.85 | 250.16 | 114.02 | 56.90 | 19.14 | 49.05 | 1485.4 |
| FY 1989 | 6.64 | 45.52 | 56.67 | 161.55 | 401.55 | 306.64 | 94.61 | 279.37 | 282.55 | 65.06 | 9.52 | 53.89 | 1763.6 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 51.46 | 107.47 | 126.26 | 113.30 | 170.42 | 213.35 | 210.89 | 212.57 | 149.07 | 54.15 | 22.33 | 17.47 | 1448.7 |
| FY 1989 | 8.99 | 11.12 | 44.67 | 119.09 | 431.97 | 201.89 | 184.26 | 268.76 | 145.27 | 198.89 | 50.47 | 47.91 | 1713.3 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.65 | 3.75 | 3.19 | 2.85 | 3.27 | 3.92 | 5.03 | 6.09 | 4.24 | 3.54 | 3.31 | 4.55 | 47.39 |
| FY 1989 | 3.50 | 2.78 | 3.50 | 3.96 | 5.06 | 5.48 | 2.22 | 7.95 | 7.98 | 6.15 | 3.22 | 7.21 | 59.01 |
| DEVIATION | -0.15 | -0.97 | 0.31 | 1.11 | 1.79 | 1.56 | -2.81 | 1.86 | 3.74 | 2.61 | -0.09 | 2.66 | 11.62 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 403.77 | 406.15 | 406.85 | 409.45 | 407.43 | 413.35 | 407.89 | 408.23 | 415.36 | 407.57 | 404.32 | 404.48 | |
| MAXIMUM | 404.20 | 406.31 | 407.17 | 409.58 | 415.24 | 413.63 | 413.35 | 413.97 | 417.26 | 415.36 | 407.57 | 406.66 | |
| MINIMUM | 403.30 | 403.60 | 406.15 | 405.17 | 404.67 | 404.51 | 407.37 | 407.51 | 407.57 | 407.39 | 404.32 | 404.25 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 147.95 | 180.12 | 190.48 | 230.99 | 199.11 | 300.82 | 205.96 | 211.30 | 341.49 | 201.19 | 155.12 | 157.28 | |



RED RIVER BASIN

| PINE CREEK LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1929 THRU 1981 | 22.63 | 38.04 | 56.04 | 60.24 | 78.03 | 82.93 | 95.41 | 104.78 | 42.28 | 17.31 | 8.38 | 22.66 | 628.7 |
| FY 1989 | 0.84 | 46.85 | 44.13 | 96.59 | 180.89 | 123.07 | 46.02 | 190.81 | 120.50 | 27.81 | 3.11 | 35.50 | 916.1 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 23.07 | 52.89 | 66.10 | 53.88 | 72.25 | 90.77 | 81.41 | 90.99 | 71.12 | 15.28 | 9.10 | 11.62 | 638.5 |
| FY 1989 | 3.98 | 26.30 | 55.27 | 52.42 | 152.91 | 141.08 | 74.65 | 155.51 | 162.29 | 31.52 | 7.88 | 40.66 | 904.5 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 3.76 | 3.89 | 3.59 | 3.12 | 3.48 | 4.25 | 5.15 | 6.21 | 4.28 | 3.87 | 3.53 | 4.67 | 49.80 |
| FY 1989 | 3.47 | 4.30 | 3.08 | 4.14 | 5.36 | 4.88 | 4.00 | 9.03 | 7.69 | 5.92 | 2.85 | 7.69 | 62.41 |
| DEVIATION | -0.29 | 0.41 | -0.51 | 1.02 | 1.88 | 0.63 | -1.15 | 2.82 | 3.41 | 2.05 | -0.68 | 3.02 | 12.61 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 437.77 | 442.50 | 439.87 | 448.37 | 452.41 | 449.70 | 444.60 | 450.17 | 442.50 | 441.36 | 439.91 | 438.36 | |
| MAXIMUM | 438.79 | 443.68 | 442.50 | 448.52 | 458.65 | 452.41 | 449.70 | 455.75 | 454.59 | 444.53 | 441.36 | 442.82 | |
| MINIMUM | 437.68 | 437.45 | 438.15 | 437.80 | 438.03 | 438.27 | 441.54 | 442.56 | 442.39 | 441.36 | 439.91 | 438.29 | |
| POOL CONTENT-EOM | | | | | | | | | | | | | |
| (1000AC.FT) | 52.91 | 72.86 | 61.15 | 104.97 | 132.41 | 113.49 | 83.35 | 116.61 | 72.86 | 67.60 | 61.31 | 55.14 | |

| BROKEN BOW LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1930 THRU 1981 | 34.81 | 58.40 | 95.11 | 111.71 | 114.40 | 140.87 | 130.36 | 138.16 | 52.17 | 26.71 | 14.15 | 23.55 | 940.4 |
| FY 1989 | 2.74 | 118.13 | 69.66 | 140.63 | 229.69 | 116.83 | 41.26 | 190.81 | 79.54 | 101.55 | 8.45 | 6.88 | 1106.1 |
| RELEASES(1000AC.FT.) | | | | | | | | | | | | | |
| AVG 1976 THRU 1989 | 25.57 | 50.90 | 92.44 | 80.84 | 81.79 | 103.89 | 112.87 | 97.12 | 86.94 | 50.77 | 33.15 | 21.45 | 837.7 |
| FY 1989 | 8.10 | 20.24 | 66.66 | 104.88 | 206.23 | 158.83 | 76.72 | 130.25 | 124.93 | 86.20 | 20.94 | 9.06 | 1013.1 |
| RAINFALL(INCHES) | | | | | | | | | | | | | |
| AVG 1930 THRU 1980 | 4.14 | 4.08 | 4.15 | 3.72 | 3.83 | 4.89 | 5.28 | 6.29 | 4.31 | 4.23 | 3.69 | 4.60 | 53.21 |
| FY 1989 | 4.14 | 9.08 | 3.45 | 5.03 | 6.59 | 5.07 | 3.00 | 10.36 | 9.98 | 9.87 | 1.93 | 4.98 | 73.48 |
| DEVIATION | 0.00 | 5.00 | -0.70 | 1.31 | 2.76 | 0.18 | -2.28 | 4.07 | 5.67 | 5.64 | -1.76 | 0.38 | 20.27 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 594.28 | 601.12 | 601.22 | 603.57 | 605.08 | 602.02 | 599.19 | 603.04 | 599.52 | 600.20 | 598.92 | 598.45 | |
| MAXIMUM | 594.91 | 601.54 | 601.22 | 603.83 | 609.36 | 605.08 | 602.15 | 606.26 | 603.04 | 602.54 | 600.20 | 598.92 | |
| MINIMUM | 594.19 | 594.01 | 599.22 | 599.25 | 599.61 | 599.15 | 598.83 | 599.19 | 599.52 | 599.39 | 598.92 | 598.40 | |
| POOL CONTENT-EOM (1000AC.FT) | 845.86 | 941.24 | 942.69 | 977.02 | 999.47 | 954.27 | 913.69 | 969.19 | 918.37 | 928.04 | 909.88 | 903.27 | |

RED RIVER BASIN

| DEQUEEN LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 7.4 | 15.1 | 22.3 | 23.3 | 25.1 | 30.4 | 28.4 | 29.3 | 10.7 | 6.2 | 3.9 | 6.0 | 208.1 |
| WY 1989 | 1.2 | 43.9 | 13.1 | 30.2 | 52.6 | 28.4 | 8.5 | 35.5 | 14.4 | 20.6 | 3.4 | 2.0 | 253.8 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1979 thru 1989 | 9.1 | 19.0 | 30.6 | 19.2 | 23.1 | 27.6 | 26.2 | 25.8 | 19.9 | 11.2 | 5.0 | 3.4 | 220.1 |
| WY 1989 | .7 | 25.0 | 28.1 | 20.1 | 51.7 | 31.8 | 17.6 | 22.2 | 26.5 | 18.7 | 4.7 | 1.4 | 248.5 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 4.1 | 4.5 | 4.3 | 3.6 | 3.9 | 4.9 | 5.2 | 6.4 | 4.2 | 4.4 | 3.3 | 4.3 | 53.1 |
| WY 1989 | 4.8 | 9.7 | 2.9 | 5.0 | 5.9 | 3.6 | 2.1 | 8.1 | 5.6 | 8.9 | 2.4 | 4.7 | 63.7 |
| Deviation | .7 | 5.2 | -1.4 | 1.4 | 2.0 | -1.3 | -3.1 | 1.7 | 1.4 | 4.5 | -.9 | .4 | 10.6 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 436.47 | 446.23 | 438.52 | 443.75 | 444.11 | 442.31 | 437.02 | 443.85 | 437.09 | 437.90 | 436.77 | 436.92 | |
| Maximum | 436.47 | 448.63 | 446.23 | 443.99 | 451.37 | 444.11 | 442.31 | 447.49 | 443.85 | 442.66 | 437.90 | 437.05 | |
| Minimum | 436.01 | 436.47 | 437.15 | 437.21 | 437.34 | 437.03 | 437.00 | 437.02 | 437.03 | 437.09 | 436.77 | 436.68 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 34.0 | 52.7 | 37.5 | 47.5 | 48.2 | 44.6 | 34.9 | 47.7 | 35.1 | 36.4 | 34.5 | 34.8 | |

| GILLHAM LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 13.6 | 27.1 | 41.6 | 44.3 | 44.7 | 55.9 | 48.4 | 48.3 | 19.5 | 11.9 | 5.1 | 9.5 | 369.9 |
| WY 1989 | 2.6 | 65.0 | 20.7 | 51.6 | 95.5 | 59.3 | 17.2 | 63.4 | 23.5 | 80.9 | 11.2 | 4.7 | 495.6 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1977 thru 1989 | 10.3 | 31.2 | 50.4 | 36.5 | 38.7 | 47.0 | 57.4 | 44.8 | 30.7 | 16.4 | 10.0 | 3.8 | 377.2 |
| WY 1989 | 13.2 | 35.5 | 44.7 | 39.1 | 97.0 | 42.5 | 36.1 | 49.8 | 37.2 | 64.2 | 22.3 | 2.6 | 484.2 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 4.2 | 4.7 | 4.3 | 3.8 | 4.1 | 5.2 | 5.3 | 6.4 | 4.6 | 4.5 | 3.3 | 4.6 | 55.0 |
| WY 1989 | 4.4 | 10.0 | 3.1 | 4.9 | 7.1 | 4.1 | 2.9 | 8.9 | 6.0 | 11.6 | 1.6 | 3.5 | 68.1 |
| Deviation | .2 | 5.3 | -1.2 | 1.1 | 3.0 | -1.1 | -2.4 | 2.5 | 1.4 | 7.1 | -1.7 | -1.1 | 13.1 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 492.06 | 513.15 | 496.82 | 505.99 | 504.92 | 514.98 | 503.05 | 511.52 | 502.37 | 512.74 | 501.70 | 501.38 | |
| Maximum | 501.22 | 517.59 | 513.15 | 507.66 | 516.92 | 515.90 | 514.98 | 518.28 | 511.52 | 529.33 | 512.74 | 501.75 | |
| Minimum | 492.06 | 491.96 | 492.31 | 492.15 | 494.56 | 501.70 | 502.17 | 502.24 | 501.99 | 501.81 | 501.55 | 501.38 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1,000 AC. FT.) | 21.2 | 50.5 | 26.4 | 38.8 | 37.2 | 53.8 | 34.5 | 47.7 | 33.5 | 49.8 | 32.6 | 32.2 | |

| DIERKS LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 4.6 | 10.2 | 16.8 | 18.6 | 17.9 | 22.0 | 19.2 | 20.4 | 7.2 | 4.5 | 1.2 | 3.0 | 145.6 |
| WY 1989 | .7 | 28.0 | 8.0 | 16.8 | 36.9 | 25.5 | 6.2 | 14.9 | 10.9 | 21.9 | 3.2 | .1 | 173.1 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1977 thru 1989 | 4.4 | 8.2 | 17.1 | 15.8 | 13.6 | 19.3 | 18.7 | 15.6 | 9.8 | 7.2 | 2.4 | .8 | 132.9 |
| WY 1989 | .4 | 9.4 | 22.5 | 12.3 | 24.2 | 31.5 | 19.0 | 12.7 | 12.2 | 16.7 | 6.9 | .7 | 168.5 |
| Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 4.7 | 4.8 | 4.6 | 3.9 | 4.2 | 5.2 | 5.2 | 6.2 | 4.8 | 4.2 | 3.2 | 3.9 | 54.9 |
| WY 1989 | 5.0 | 10.7 | 2.8 | 4.4 | 7.9 | 6.2 | 1.8 | 8.5 | 5.9 | 11.8 | 1.6 | 3.2 | 69.8 |
| Deviation | .3 | 5.9 | -1.8 | .5 | 3.7 | 1.0 | -3.4 | 2.3 | 1.1 | 7.6 | -1.6 | -.7 | 14.9 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 524.98 | 536.63 | 527.77 | 530.67 | 537.85 | 534.40 | 525.88 | 527.21 | 525.98 | 529.29 | 525.26 | 524.41 | |
| Maximum | 524.98 | 537.61 | 536.63 | 530.90 | 539.81 | 537.85 | 534.40 | 530.98 | 530.04 | 536.01 | 529.29 | 525.26 | |
| Minimum | 524.56 | 524.98 | 525.94 | 526.02 | 529.20 | 526.16 | 525.88 | 525.85 | 525.94 | 525.98 | 525.26 | 524.41 | |
| Pool Content EOM (1,000 AC. FT.) | 28.3 | 46.7 | 32.1 | 36.5 | 49.0 | 42.7 | 29.5 | 31.3 | 29.6 | 34.4 | 28.7 | 27.5 | |

| MILLWOOD LAKE | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1929 thru 1989 | 118.5 | 262.3 | 408.6 | 438.1 | 499.7 | 582.2 | 598.5 | 647.9 | 295.2 | 131.0 | 71.3 | 95.8 | 4149.1 |
| WY 1989 | 37.6 | 431.9 | 348.6 | 452.0 | 1098.2 | 781.0 | 385.6 | 851.2 | 786.5 | 494.9 | 134.9 | 76.4 | 5878.8 |
| Releases (1,000 AC. FT.) | | | | | | | | | | | | | |
| Avg 1976 thru 1989 | 113.0 | 264.4 | 457.3 | 375.3 | 439.4 | 543.1 | 505.5 | 465.0 | 384.9 | 191.7 | 68.2 | 91.9 | 3899.7 |
| WY 1989 | 15.2 | 270.7 | 400.4 | 431.2 | 1094.8 | 725.8 | 469.2 | 616.7 | 997.2 | 476.6 | 134.7 | 170.3 | 5802.8 |
| Intervening Basin Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1930 thru 1989 | 3.9 | 4.5 | 4.0 | 3.4 | 3.8 | 4.4 | 4.7 | 5.8 | 4.0 | 3.6 | 2.9 | 3.8 | 48.8 |
| WY 1989 | 5.0 | 9.3 | 3.0 | 3.8 | 6.7 | 5.1 | 2.8 | 9.1 | 6.9 | 8.7 | 2.7 | 3.5 | 66.6 |
| Deviation | 1.1 | 4.8 | -1.0 | .4 | 2.9 | .7 | -1.9 | 3.3 | 2.9 | 5.1 | -.2 | -.3 | 17.8 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 256.14 | 261.66 | 260.00 | 260.57 | 260.62 | 262.10 | 259.23 | 265.50 | 259.31 | 259.62 | 259.28 | 255.34 | |
| Maximum | 256.14 | 262.13 | 261.66 | 260.72 | 263.38 | 262.10 | 262.10 | 266.55 | 265.70 | 261.69 | 259.76 | 259.28 | |
| Minimum | 255.24 | 256.14 | 259.17 | 259.21 | 259.75 | 259.33 | 259.22 | 259.13 | 259.11 | 259.18 | 259.15 | 255.27 | |
| Pool Content EOM | 125.8 | 283.4 | 229.0 | 247.2 | 248.8 | 298.6 | 206.0 | 430.3 | 208.4 | 217.7 | 207.5 | 108.6 | |

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WRIGHT PATMAN LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1957 thru 1989 | 69.9 | 174.6 | 280.2 | 159.6 | 246.5 | 283.3 | 275.0 | 388.0 | 192.1 | 68.5 | 16.7 | 32.2 | 2186.7 |
| WY 1989 | 6.8 | 317.7 | 332.5 | 160.4 | 812.1 | 319.3 | 255.7 | 720.7 | 746.3 | 275.9 | 44.1 | 1.9 | 3993.3 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1957 thru 1989 | 93.1 | 154.6 | 229.6 | 220.2 | 223.1 | 260.5 | 213.3 | 233.8 | 231.9 | 221.1 | 54.1 | 39.7 | 2174.9 |
| WY 1989 | 0.6 | 98.3 | 497.7 | 176.7 | 446.9 | 535.2 | 313.9 | 126.2 | 577.0 | 571.9 | 394.0 | 27.6 | 3765.9 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1958 thru 1989 | 3.75 | 3.68 | 3.86 | 1.97 | 3.03 | 3.58 | 3.95 | 4.03 | 3.64 | 2.79 | 2.07 | 3.28 | 39.62 |
| WY 1989 | 4.14 | 9.94 | 5.97 | 3.24 | 6.87 | 9.32 | 1.36 | 8.31 | 7.24 | 5.98 | 3.53 | 0.52 | 66.42 |
| Deviation | 0.39 | 6.26 | 2.11 | 1.27 | 3.84 | 5.74 | -2.59 | 4.28 | 3.60 | 3.19 | 1.46 | -2.76 | 26.80 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 223.11 | 229.67 | 224.38 | 223.63 | 233.57 | 227.87 | 225.60 | 238.88 | 241.30 | 235.67 | 226.59 | 225.27 | |
| Maximum | 223.35 | 229.67 | 230.82 | 224.38 | 233.57 | 233.57 | 229.67 | 239.14 | 243.29 | 241.30 | 235.67 | 226.59 | |
| Minimum | 222.92 | 223.11 | 224.38 | 222.10 | 223.49 | 225.93 | 225.60 | 225.52 | 237.86 | 235.52 | 226.59 | 225.27 | |
| Pool Content EOM (1000 AC. FT.) | 216.65 | 424.62 | 250.71 | 230.22 | 587.93 | 359.60 | 286.27 | 863.14 | 1010.16 | 689.38 | 317.06 | 276.39 | |





| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LAKE O THE PINES** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1958 thru 1989 | 11.9 | 27.6 | 57.5 | 49.7 | 72.3 | 91.5 | 74.8 | 68.1 | 33.0 | 10.9 | 4.7 | 10.9 | 513.0 |
| WY 1989 | 8.0 | 21.8 | 42.3 | 42.0 | 115.4 | 129.5 | 60.8 | 189.9 | 62.5 | 16.3 | 8.7 | 0.6 | 697.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1958 thru 1989 | 9.2 | 14.3 | 46.3 | 54.6 | 62.8 | 75.7 | 64.8 | 55.2 | 38.1 | 14.0 | 9.8 | 11.7 | 456.7 |
| WY 1989 | 1.5 | 0.4 | 9.3 | 46.7 | 95.3 | 65.4 | 93.7 | 78.0 | 150.9 | 23.6 | 4.5 | 12.1 | 581.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1980 thru 1989 | 5.32 | 5.05 | 5.36 | 2.21 | 4.19 | 3.81 | 3.06 | 4.54 | 4.78 | 1.78 | 1.79 | 1.96 | 43.87 |
| WY 1989 | 6.94 | 4.09 | 3.72 | 3.86 | 2.75 | 10.77 | 3.12 | 6.21 | 7.33 | 2.22 | 2.99 | 0.84 | 54.84 |
| Deviation | 1.62 | -0.96 | -1.64 | 1.65 | -1.44 | 6.96 | 0.06 | 1.67 | 2.55 | 0.44 | 1.20 | -1.12 | 10.97 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 226.64 | 227.60 | 229.24 | 228.86 | 229.80 | 232.69 | 230.79 | 235.47 | 231.19 | 230.40 | 230.16 | 229.22 | |
| Maximum | 226.68 | 227.60 | 229.24 | 229.30 | 230.72 | 232.69 | 234.26 | 236.51 | 235.47 | 231.19 | 230.48 | 230.28 | |
| Minimum | 226.11 | 226.53 | 227.60 | 228.63 | 228.86 | 228.60 | 230.79 | 229.70 | 231.19 | 230.23 | 230.12 | 229.22 | |
| Pool Content EOM (1000 AC. FT.) | 221.37 | 238.33 | 268.87 | 261.62 | 279.74 | 339.68 | 299.54 | 404.07 | 307.76 | 291.65 | 286.86 | 268.48 | |

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SAM RAYBURN RESERVOIR** | | | | | | | | | | | | | |
| Inflow(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1908 thru 1989 | 42.5 | 95.7 | 186.6 | 253.1 | 265.6 | 283.0 | 277.0 | 305.4 | 144.1 | 61.0 | 34.4 | 32.5 | 1981.0 |
| WY 1989 | 15.2 | 19.2 | 86.5 | 397.6 | 388.2 | 306.1 | 506.3 | 525.9 | 631.0 | 422.4 | 50.8 | 28.5 | 3377.6 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 70.1 | 52.2 | 59.1 | 109.3 | 123.2 | 186.8 | 159.2 | 182.9 | 201.8 | 175.1 | 152.1 | 101.4 | 1576.4 |
| WY 1989 | 144.9 | 130.3 | 103.9 | 46.4 | 0.0 | 35.6 | 184.4 | 138.0 | 419.5 | 531.7 | 335.6 | 111.4 | 2181.6 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 5.12 | 5.75 | 5.58 | 4.78 | 4.50 | 5.13 | 3.94 | 6.12 | 5.98 | 5.00 | 3.73 | 3.79 | 59.41 |
| WY 1989 | 2.97 | 1.78 | 6.09 | 9.15 | 4.01 | 7.92 | 1.82 | 7.13 | 16.20 | 8.40 | 2.13 | 1.97 | 69.57 |
| Deviation | -2.15 | -3.97 | 0.51 | 4.37 | -0.49 | 2.79 | -2.12 | 1.01 | 10.22 | 3.40 | -1.60 | -1.82 | 10.16 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 153.47 | 151.78 | 151.35 | 155.32 | 159.25 | 161.60 | 164.20 | 167.08 | 168.38 | 167.00 | 164.07 | 162.83 | |
| Maximum | 155.40 | 153.47 | 151.78 | 155.32 | 159.25 | 161.60 | 164.80 | 167.37 | 168.38 | 171.15 | 167.00 | 164.07 | |
| Minimum | 153.47 | 151.78 | 151.24 | 151.07 | 155.32 | 159.25 | 161.60 | 163.86 | 165.80 | 167.00 | 164.07 | 162.83 | |
| Pool Content EOM (1000 AC. FT.) | 1807.84 | 1667.44 | 1632.86 | 1969.89 | 2344.35 | 2588.18 | 2875.32 | 3215.44 | 3377.14 | 3205.66 | 2860.53 | 2721.74 | |



| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B. A. STEINHAGEN LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1908 thru 1989 | 82.0 | 155.7 | 285.4 | 428.2 | 434.0 | 501.3 | 498.3 | 579.9 | 303.4 | 163.3 | 92.2 | 73.8 | 3597.5 |
| WY 1989 | 170.3 | 156.7 | 168.5 | 243.9 | 270.8 | 257.8 | 484.9 | 566.1 | 965.7 | 1320.7 | 451.3 | 165.3 | 5221.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1952 thru 1989 | 103.9 | 143.0 | 248.7 | 320.0 | 349.7 | 417.3 | 397.7 | 548.2 | 323.4 | 218.8 | 138.0 | 115.8 | 3324.6 |
| WY 1989 | 169.4 | 161.2 | 169.6 | 223.5 | 273.5 | 262.3 | 473.2 | 565.5 | 936.2 | 1325.4 | 448.7 | 167.4 | 5176.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1970 thru 1989 | 3.76 | 5.10 | 5.62 | 4.39 | 3.77 | 4.36 | 4.02 | 6.54 | 6.23 | 3.34 | 2.93 | 4.03 | 54.10 |
| WY 1989 | 1.69 | 0.57 | 7.09 | 5.22 | 1.99 | 7.10 | 1.48 | 8.74 | 16.51 | 6.57 | 0.94 | 1.46 | 59.36 |
| Deviation | -2.07 | -4.53 | 1.47 | 0.83 | -1.78 | 2.74 | -2.54 | 2.20 | 10.28 | 3.23 | -1.99 | -2.57 | 5.26 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 82.25 | 81.60 | 81.34 | 82.82 | 82.51 | 81.91 | 82.56 | 82.15 | 83.57 | 82.85 | 82.59 | 81.97 | |
| Maximum | 82.49 | 82.25 | 82.40 | 83.14 | 82.82 | 83.05 | 82.77 | 83.11 | 83.57 | 84.07 | 82.85 | 82.71 | |
| Minimum | 81.83 | 81.56 | 81.06 | 81.04 | 82.05 | 81.67 | 81.26 | 81.16 | 81.26 | 81.08 | 81.80 | 81.90 | |
| Pool Content EOM (1000 AC. FT.) | 84.38 | 76.48 | 73.47 | 91.81 | 87.71 | 80.18 | 88.36 | 83.13 | 102.30 | 92.21 | 88.75 | 80.91 | |

## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BENBROOK LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 2.6 | 2.4 | 2.3 | 2.8 | 5.8 | 7.1 | 8.8 | 12.8 | 7.7 | 1.7 | 1.1 | 1.5 | 56.7 |
| WY 1989 | 0.7 | 0.6 | 1.1 | 2.6 | 7.7 | 21.2 | 10.9 | 98.2 | 96.9 | 0.5 | 3.3 | 1.4 | 245.2 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 1.1 | 3.4 | 1.5 | 1.9 | 3.2 | 4.9 | 4.4 | 8.5 | 13.7 | 3.7 | 1.2 | 0.9 | 48.3 |
| WY 1989 | 0.8 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 8.2 | 18.8 | 104.2 | 64.4 | 0.7 | 1.9 | 200.8 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 3.15 | 2.06 | 1.90 | 1.61 | 1.84 | 2.40 | 3.54 | 4.55 | 3.30 | 2.26 | 2.02 | 3.24 | 31.89 |
| WY 1989 | 1.50 | 0.71 | 2.62 | 3.86 | 3.41 | 3.39 | 1.84 | 10.61 | 9.16 | 1.26 | 2.81 | 3.55 | 44.71 |
| Deviation | -1.65 | -1.35 | 0.72 | 2.25 | 1.57 | 0.98 | -1.70 | 6.06 | 5.86 | -1.00 | 0.79 | 0.31 | 12.82 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 686.21 | 685.81 | 685.80 | 686.29 | 688.46 | 694.12 | 694.38 | 710.30 | 708.44 | 694.18 | 694.14 | 693.42 | |
| Maximum | 686.65 | 686.21 | 685.82 | 686.29 | 688.46 | 694.12 | 695.37 | 710.58 | 716.60 | 708.44 | 694.46 | 694.14 | |
| Minimum | 686.12 | 685.81 | 685.71 | 685.68 | 686.22 | 688.46 | 694.12 | 694.38 | 708.44 | 694.18 | 694.10 | 693.42 | |
| Pool Content EOM (1000 AC. FT.) | 61.59 | 60.37 | 60.34 | 61.84 | 68.75 | 88.70 | 89.69 | 166.53 | 155.85 | 88.93 | 88.78 | 86.08 | |



## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **JOE POOL LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1987 thru 1989 | 1.3 | 1.8 | 3.0 | 3.0 | 9.6 | 6.2 | 2.0 | 40.6 | 16.8 | 1.2 | 2.1 | 2.3 | 89.7 |
| WY 1989 | 0.3 | 0.9 | 0.7 | 4.6 | 14.0 | 12.8 | 3.3 | 104.7 | 38.2 | 0.0 | 3.6 | 1.3 | 184.2 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1987 thru 1989 | 0.2 | 0.2 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 | 0.8 | 5.8 | 11.9 | 0.2 | 0.2 | 20.6 |
| WY 1989 | 0.1 | 0.0 | 0.5 | 0.1 | 0.0 | 0.1 | 0.1 | 1.7 | 17.1 | 35.5 | 0.0 | 0.0 | 55.1 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1986 thru 1989 | 2.64 | 2.75 | 2.52 | 1.47 | 3.19 | 1.68 | 2.05 | 6.67 | 5.51 | 2.30 | 1.72 | 3.35 | 35.86 |
| WY 1989 | 1.56 | 1.65 | 2.48 | 3.30 | 3.93 | 3.29 | 1.95 | 13.21 | 9.40 | 0.49 | 3.93 | 2.71 | 46.95 |
| Deviation | -1.08 | -1.10 | -0.04 | 1.83 | 0.74 | 1.61 | -0.10 | 6.54 | 2.89 | -1.81 | 2.26 | -0.64 | 11.09 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 505.86 | 505.61 | 505.31 | 506.08 | 508.77 | 510.88 | 511.04 | 525.60 | 527.30 | 522.09 | 521.90 | 521.52 | |
| Maximum | 506.26 | 505.86 | 505.61 | 506.08 | 508.77 | 510.88 | 511.17 | 525.88 | 528.97 | 527.30 | 522.21 | 521.90 | |
| Minimum | 505.85 | 505.61 | 505.28 | 505.14 | 506.08 | 508.76 | 510.74 | 511.01 | 525.21 | 522.09 | 521.90 | 521.52 | |
| Pool Content EOM (1000 AC. FT.) | 79.25 | 78.08 | 76.69 | 80.29 | 93.60 | 104.86 | 105.74 | 205.13 | 219.42 | 177.57 | 176.15 | 173.33 | |

## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RAY ROBERTS LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1987 thru 1989 | 1.6 | 7.1 | 54.9 | 26.7 | 36.9 | 27.5 | 6.1 | 59.7 | 66.2 | 9.9 | 2.7 | 13.8 | 313.1 |
| WY 1989 | 0.7 | 8.5 | 10.5 | 44.7 | 88.1 | 62.8 | 7.0 | 174.2 | 190.0 | 24.5 | 5.1 | 14.2 | 630.1 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1987 thru 1989 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 1.4 |
| WY 1989 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 1.5 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1987 thru 1989 | 1.73 | 4.35 | 3.42 | 3.31 | 3.26 | 2.99 | 1.38 | 6.00 | 5.84 | 3.09 | 1.53 | 4.05 | 40.94 |
| WY 1989 | 1.00 | 3.40 | 3.60 | 6.40 | 3.30 | 4.70 | 1.00 | 6.90 | 12.15 | 5.00 | 0.90 | 4.70 | 53.25 |
| Deviation | -0.73 | -0.95 | 0.18 | 3.09 | 0.24 | 1.71 | -0.38 | 0.90 | 6.31 | 1.91 | -0.63 | 0.65 | 12.31 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 592.71 | 593.33 | 594.31 | 598.95 | 606.46 | 610.69 | 610.74 | 620.33 | 628.00 | 628.36 | 627.89 | 627.86 | |
| Maximum | 593.03 | 593.33 | 594.31 | 598.95 | 606.46 | 610.69 | 610.77 | 620.33 | 628.05 | 628.45 | 628.36 | 628.15 | |
| Minimum | 592.63 | 592.59 | 593.30 | 594.30 | 598.95 | 606.45 | 610.69 | 610.74 | 620.33 | 627.98 | 627.89 | 627.70 | |
| Pool Content EOM (1000 AC. FT.) | 130.20 | 135.22 | 143.40 | 186.35 | 272.87 | 331.75 | 332.49 | 497.99 | 675.83 | 685.17 | 673.00 | 672.23 | |



TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LEWISVILLE LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 39.4 | 29.1 | 26.9 | 25.0 | 45.2 | 58.4 | 69.8 | 97.2 | 58.9 | 18.3 | 10.5 | 27.6 | 506.3 |
| WY 1989 | 1.5 | 7.0 | 12.5 | 44.6 | 110.3 | 93.6 | 17.8 | 136.6 | 353.0 | 60.7 | 14.5 | 19.6 | 871.7 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1955 thru 1989 | 25.5 | 37.0 | 37.5 | 24.7 | 27.4 | 34.5 | 34.4 | 64.7 | 78.0 | 46.3 | 29.5 | 20.8 | 460.3 |
| WY 1989 | 2.8 | 2.8 | 4.7 | 7.2 | 1.4 | 0.0 | 0.0 | 0.0 | 49.0 | 275.3 | 60.8 | 6.4 | 410.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1955 thru 1989 | 3.44 | 2.49 | 2.00 | 1.71 | 2.27 | 2.92 | 3.89 | 5.12 | 3.57 | 2.12 | 2.03 | 3.92 | 35.48 |
| WY 1989 | 0.80 | 2.12 | 2.35 | 4.78 | 3.91 | 3.23 | 1.27 | 6.89 | 12.81 | 4.36 | 0.94 | 3.96 | 47.32 |
| Deviation | -2.64 | -0.37 | 0.35 | 3.07 | 1.64 | 0.31 | -2.62 | 1.77 | 9.24 | 2.24 | -1.09 | 0.04 | 11.94 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 507.90 | 507.64 | 507.77 | 509.70 | 514.74 | 518.29 | 518.51 | 522.80 | 531.17 | 524.36 | 522.11 | 521.93 | |
| Maximum | 508.50 | 507.90 | 507.83 | 509.70 | 514.74 | 518.29 | 518.57 | 522.82 | 532.31 | 531.17 | 524.36 | 522.41 | |
| Minimum | 507.90 | 507.63 | 507.57 | 507.49 | 509.70 | 514.74 | 518.29 | 518.46 | 522.80 | 524.36 | 522.11 | 521.88 | |
| Pool Content EOM (1000 AC. FT.) | 315.67 | 311.36 | 313.51 | 346.49 | 451.60 | 538.22 | 543.86 | 664.89 | 949.59 | 712.78 | 644.25 | 638.92 | |

## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GRAPEVINE LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 10.9 | 6.0 | 6.8 | 9.0 | 13.5 | 16.5 | 22.2 | 30.8 | 19.2 | 5.2 | 1.6 | 5.5 | 147.1 |
| WY 1989 | 0.1 | 2.4 | 3.6 | 14.3 | 42.5 | 46.5 | 4.8 | 101.8 | 228.9 | 7.2 | 3.1 | 2.8 | 457.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 4.4 | 7.2 | 9.9 | 8.0 | 5.5 | 6.3 | 10.4 | 12.1 | 18.4 | 15.5 | 12.5 | 5.1 | 115.4 |
| WY 1989 | 4.8 | 1.5 | 2.8 | 2.8 | 3.9 | 16.2 | 39.0 | 16.0 | 76.5 | 120.2 | 101.4 | 9.2 | 394.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 3.15 | 2.36 | 1.98 | 1.65 | 1.98 | 2.67 | 3.69 | 5.08 | 3.27 | 2.20 | 1.98 | 3.61 | 33.63 |
| WY 1989 | 1.12 | 1.82 | 3.09 | 4.64 | 3.84 | 4.12 | 2.70 | 11.81 | 12.14 | 1.00 | 2.36 | 2.07 | 51.71 |
| Deviation | -2.03 | -0.54 | 1.11 | 2.99 | 1.86 | 1.45 | -0.99 | 6.73 | 8.87 | -1.20 | 0.38 | -0.54 | 18.08 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 529.32 | 529.05 | 528.91 | 530.52 | 535.92 | 539.57 | 534.68 | 544.76 | 558.58 | 547.63 | 535.48 | 534.01 | |
| Maximum | 530.46 | 529.32 | 529.05 | 530.54 | 536.02 | 539.57 | 539.58 | 545.34 | 562.35 | 558.58 | 547.63 | 535.48 | |
| Minimum | 529.32 | 529.05 | 528.79 | 528.79 | 530.52 | 535.47 | 534.68 | 534.56 | 543.75 | 547.63 | 535.48 | 534.01 | |
| Pool Content EOM (1000 AC. FT.) | 142.43 | 140.74 | 139.87 | 150.13 | 187.86 | 216.11 | 178.79 | 261.05 | 407.74 | 288.43 | 184.62 | 173.97 | |



## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LAVON LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 13.5 | 19.1 | 24.5 | 24.9 | 37.5 | 40.2 | 50.6 | 68.5 | 40.3 | 13.4 | 3.2 | 11.5 | 347.1 |
| WY 1989 | 5.0 | 12.3 | 13.6 | 35.9 | 120.5 | 131.0 | 43.5 | 188.1 | 224.4 | 68.6 | 17.1 | 3.8 | 863.8 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1954 thru 1989 | 10.2 | 11.4 | 20.5 | 17.3 | 14.3 | 22.9 | 17.5 | 50.1 | 39.0 | 16.6 | 8.7 | 5.1 | 233.5 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.2 | 62.7 | 39.0 | 131.9 | 80.2 | 100.7 | 71.8 | 505.5 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1954 thru 1989 | 3.59 | 2.86 | 2.60 | 1.95 | 2.55 | 3.25 | 4.19 | 5.68 | 3.63 | 2.57 | 1.97 | 4.35 | 39.20 |
| WY 1989 | 0.99 | 2.51 | 2.71 | 3.41 | 4.66 | 3.10 | 1.61 | 9.00 | 12.18 | 4.02 | 1.42 | 3.57 | 48.18 |
| Deviation | -2.60 | -0.35 | 0.11 | 1.46 | 2.11 | -0.15 | -2.58 | 3.32 | 8.55 | 1.45 | -0.55 | -1.78 | 8.98 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 485.91 | 485.58 | 485.53 | 486.73 | 492.24 | 496.41 | 494.70 | 499.70 | 502.11 | 500.62 | 496.21 | 492.01 | |
| Maximum | 486.74 | 485.91 | 485.58 | 486.73 | 492.24 | 496.41 | 496.95 | 500.10 | 503.62 | 502.26 | 500.62 | 496.21 | |
| Minimum | 485.87 | 485.58 | 485.45 | 485.28 | 486.73 | 492.07 | 494.70 | 493.72 | 499.52 | 500.62 | 496.21 | 492.01 | |
| Pool Content EOM (1000 AC. FT.) | 337.61 | 331.72 | 330.83 | 352.49 | 461.67 | 557.37 | 516.70 | 641.32 | 707.83 | 666.21 | 552.51 | 456.74 | |

## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NAVARRO MILLS LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1907 thru 1989 | 5.7 | 6.4 | 9.3 | 9.2 | 10.6 | 11.8 | 17.3 | 28.1 | 14.6 | 3.5 | 1.4 | 2.8 | 120.5 |
| WY 1989 | 0.4 | 2.6 | 1.9 | 4.6 | 12.4 | 10.8 | 7.5 | 68.5 | 27.9 | 2.3 | 1.9 | 1.1 | 141.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 2.3 | 6.5 | 7.7 | 6.5 | 6.2 | 7.9 | 7.2 | 13.9 | 20.4 | 7.6 | 0.2 | 1.7 | 87.9 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 3.4 | 10.5 | 16.0 | 43.4 | 28.3 | 0.0 | 0.0 | 102.5 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 4.34 | 2.94 | 2.56 | 1.78 | 2.36 | 2.82 | 3.42 | 5.65 | 3.02 | 1.88 | 2.15 | 3.34 | 36.27 |
| WY 1989 | 0.83 | 3.45 | 5.51 | 2.82 | 2.43 | 2.92 | 2.19 | 11.30 | 6.58 | 3.71 | 2.66 | 2.01 | 46.41 |
| Deviation | -3.51 | 0.51 | 2.95 | 1.04 | 0.07 | 0.10 | -1.23 | 5.65 | 3.56 | 1.83 | 0.51 | -1.33 | 10.14 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 421.89 | 421.94 | 422.04 | 422.75 | 424.88 | 425.91 | 424.80 | 432.43 | 429.64 | 424.53 | 424.13 | 423.64 | |
| Maximum | 422.34 | 422.00 | 422.11 | 422.75 | 424.96 | 426.15 | 425.91 | 433.33 | 433.74 | 429.64 | 424.57 | 424.13 | |
| Minimum | 421.88 | 421.70 | 421.86 | 421.90 | 422.75 | 424.75 | 424.70 | 424.80 | 429.64 | 424.53 | 424.13 | 423.64 | |
| Pool Content EOM (1000 AC. FT.) | 44.54 | 44.76 | 45.20 | 48.41 | 58.90 | 64.33 | 58.49 | 107.04 | 86.87 | 57.11 | 55.10 | 52.68 | |



## TRINITY RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BARDWELL LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1938 thru 1989 | 3.7 | 2.9 | 4.8 | 4.0 | 6.5 | 6.7 | 10.2 | 13.4 | 7.9 | 1.7 | 0.7 | 1.9 | 64.2 |
| WY 1989 | 0.4 | 1.8 | 1.4 | 2.5 | 8.6 | 6.3 | 5.0 | 53.5 | 38.9 | 1.5 | 1.7 | 1.0 | 122.5 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 1.5 | 3.9 | 4.5 | 4.0 | 4.2 | 6.5 | 5.4 | 10.2 | 12.6 | 1.9 | 0.2 | 0.5 | 55.4 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 2.6 | 6.1 | 25.6 | 54.2 | 8.3 | 0.0 | 0.0 | 98.4 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 4.44 | 2.87 | 2.73 | 1.74 | 2.68 | 2.88 | 3.35 | 5.43 | 3.67 | 2.24 | 1.94 | 3.72 | 37.70 |
| WY 1989 | 1.78 | 3.90 | 4.96 | 2.96 | 3.37 | 2.81 | 2.93 | 7.84 | 5.36 | 2.52 | 2.77 | 2.10 | 43.30 |
| Deviation | -2.66 | 1.03 | 2.23 | 1.22 | 0.69 | -0.07 | -0.42 | 2.41 | 1.69 | 0.28 | 0.83 | -1.62 | 5.60 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 419.26 | 419.31 | 419.47 | 419.86 | 421.58 | 422.20 | 421.42 | 427.77 | 423.51 | 421.00 | 420.77 | 420.35 | |
| Maximum | 419.64 | 419.37 | 419.47 | 419.86 | 421.90 | 422.20 | 422.20 | 429.88 | 428.43 | 423.51 | 421.10 | 420.77 | |
| Minimum | 419.21 | 419.04 | 419.25 | 419.40 | 419.86 | 421.21 | 421.24 | 421.42 | 423.43 | 421.00 | 420.77 | 420.35 | |
| Pool Content EOM (1000 AC. FT.) | 46.26 | 46.42 | 46.96 | 48.29 | 54.38 | 56.67 | 53.80 | 79.28 | 61.64 | 52.29 | 51.47 | 50.00 | |

SAN JACINTO BASIN

| BARKER RESERVOIR | 88 OCT | 88 NOV | 88 DEC | 89 JAN | 89 FEB | 89 MAR | 89 APR | 89 MAY | 89 JUN | 89 JUL | 89 AUG | 89 SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLOWS (1000 AC.FT.) | | | | | | | | | | | | | |
| AUG. 1945 thru 1989 | 5.8 | 6.5 | 6.8 | 9.1 | 7.7 | 4.1 | 4.9 | 8.0 | 10.1 | 6.9 | 4.3 | 7.1 | 81.5 |
| FY 89 | 2.0 | 1.9 | 2.3 | 8.1 | 3.7 | 3.3 | 2.3 | 16.0 | 5.1 | 2.7 | 12.0 | 1.5 | 61.0 |
| RELEASES (1000 AC.FT.) | | | | | | | | | | | | | |
| AUG. 1964 thru 1989 | 6.8 | 7.0 | 7.0 | 8.2 | 8.1 | 5.5 | 4.0 | 8.6 | 9.6 | 7.0 | 4.1 | 8.2 | 84.2 |
| FY 89 | 2.0 | 1.9 | 2.3 | 7.2 | 4.4 | 3.0 | 2.5 | 9.1 | 9.4 | 4.0 | 12.1 | 1.5 | 59.6 |
| RAINFALL (INCHES) | | | | | | | | | | | | | |
| AUG. 1945 thru 1989 | 3.63 | 3.62 | 3.26 | 3.02 | 2.91 | 3.16 | 3.01 | 4.50 | 4.09 | 3.12 | 3.73 | 4.10 | 42.16 |
| FY 89 | 0.18 | 1.09 | 2.83 | 6.12 | 0.95 | 2.63 | 1.47 | 7.01 | 6.78 | 1.44 | 2.31 | 1.52 | 34.33 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 74.44 | 73.72 | 73.72 | 83.00 | 73.65 | 82.29 | 74.44 | 88.33 | 84.00 | 74.22 | 73.71 | 73.68 | |
| MAXIMUM | 74.44 | 74.40 | 74.76 | 85.87 | 83.27 | 82.90 | 82.22 | 89.35 | 87.15 | 84.44 | 87.16 | 74.23 | |
| MINIMUM | 73.67 | 73.68 | 73.65 | 73.08 | 73.65 | 73.64 | 73.67 | 73.74 | 73.67 | 73.68 | 73.71 | 73.67 | |
| POOL CONTENT E.O.M. (1000 AC.FT.) | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.36 | 0.00 | 6.79 | 1.37 | 0.00 | 0.00 | 0.00 | |
| ADDICKS RESERVOIR | | | | | | | | | | | | | |
| INFLOWS (1000 AC.FT.) | | | | | | | | | | | | | |
| AUG. 1948 thru 1989 | 6.5 | 6.6 | 7.0 | 6.2 | 7.3 | 3.8 | 5.5 | 8.2 | 7.6 | 5.3 | 5.7 | 6.3 | 76.0 |
| FY 89 | 1.7 | 1.6 | 2.9 | 8.3 | 2.4 | 4.2 | 1.4 | 22.6 | 11.6 | 2.5 | 7.0 | 3.6 | 69.7 |
| RELEASES (1000 AC.FT.) | | | | | | | | | | | | | |
| AUG. 1964 thru 1989 | 7.7 | 7.8 | 7.5 | 7.3 | 7.5 | 4.7 | 4.7 | 9.3 | 8.5 | 5.9 | 4.3 | 7.6 | 82.9 |
| FY 89 | 1.8 | 1.6 | 2.9 | 6.5 | 2.8 | 4.0 | 1.6 | 17.4 | 9.0 | 9.5 | 7.7 | 5.6 | 70.2 |
| RAINFALL (INCHES) | | | | | | | | | | | | | |
| AUG. 1948 thru 1989 | 3.88 | 3.54 | 3.33 | 3.00 | 3.12 | 2.28 | 3.10 | 4.29 | 4.01 | 3.14 | 3.31 | 4.23 | 41.24 |
| FY 89 | 0.50 | 0.98 | 2.54 | 5.94 | 1.09 | 3.02 | 1.48 | 8.72 | 7.32 | 1.44 | 2.31 | 1.52 | 36.86 |
| POOL ELEVATION | | | | | | | | | | | | | |
| END OF MONTH | 72.55 | 71.65 | 71.95 | 83.23 | 71.78 | 80.86 | 72.34 | 89.76 | 90.90 | 71.79 | 71.75 | 71.78 | |
| MAXIMUM | 72.09 | 72.60 | 75.73 | 86.59 | 80.26 | 83.72 | 81.37 | 94.54 | 90.90 | 91.03 | 88.35 | 79.88 | |
| MINIMUM | 71.71 | 71.65 | 71.65 | 71.67 | 71.68 | 71.66 | 71.63 | 71.71 | 71.67 | 71.68 | 71.67 | 71.74 | |
| POOL CONTENT E.O.M. (1000 AC.FT.) | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.28 | 0.00 | 5.33 | 7.34 | 0.00 | 0.00 | 0.00 | |

## BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WHITNEY LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1899 thru 1989 | 114.6 | 64.0 | 64.8 | 54.3 | 58.6 | 68.6 | 129.0 | 267.8 | 172.3 | 93.4 | 67.8 | 102.8 | 1257.9 |
| WY 1989 | 6.7 | 6.5 | 5.8 | 10.3 | 55.6 | 110.4 | 50.8 | 613.9 | 499.8 | 34.2 | 74.6 | 87.4 | 1556.1 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1952 thru 1989 | 90.8 | 50.1 | 37.7 | 48.2 | 41.4 | 55.3 | 59.4 | 194.0 | 185.5 | 76.2 | 49.6 | 63.0 | 951.0 |
| WY 1989 | 1.5 | 1.5 | 30.5 | 1.5 | 1.4 | 10.4 | 21.0 | 368.1 | 631.2 | 73.3 | 52.1 | 36.1 | 1228.6 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 3.51 | 2.42 | 2.02 | 1.63 | 1.99 | 2.34 | 3.52 | 4.61 | 3.59 | 2.34 | 2.29 | 3.35 | 33.61 |
| WY 1989 | 2.25 | 1.40 | 2.33 | 3.01 | 3.39 | 2.28 | 1.47 | 6.77 | 7.05 | 2.41 | 5.47 | 2.52 | 40.33 |
| Deviation | -1.26 | -1.02 | 0.31 | 1.38 | 1.40 | -0.06 | -2.05 | 2.16 | 3.46 | 0.07 | 3.18 | -0.83 | 6.74 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 522.54 | 522.32 | 520.59 | 520.98 | 524.17 | 529.20 | 530.15 | 539.51 | 533.88 | 531.53 | 531.83 | 533.46 | |
| Maximum | 522.75 | 522.54 | 522.32 | 520.99 | 524.17 | 529.20 | 530.19 | 546.36 | 542.53 | 533.88 | 532.53 | 533.67 | |
| Minimum | 522.47 | 522.31 | 520.45 | 520.56 | 520.98 | 524.14 | 529.20 | 530.15 | 533.88 | 531.53 | 531.48 | 531.28 | |
| Pool Content EOM (1000 AC. FT.) | 419.95 | 416.36 | 388.54 | 394.75 | 446.96 | 542.23 | 562.67 | 793.91 | 648.29 | 593.35 | 600.17 | 638.21 | |



## BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AQUILLA LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1982 thru 1989 | 4.0 | 1.6 | 9.7 | 3.0 | 6.3 | 7.5 | 1.6 | 6.5 | 11.7 | 0.8 | 0.8 | 2.4 | 55.9 |
| WY 1989 | 0.5 | 1.7 | 1.0 | 2.6 | 9.8 | 11.8 | 3.7 | 30.1 | 19.7 | 1.8 | 2.0 | 0.9 | 85.7 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1982 thru 1989 | 0.5 | 0.3 | 4.5 | 2.8 | 1.9 | 4.0 | 2.1 | 3.1 | 11.1 | 1.3 | 0.1 | 0.0 | 31.8 |
| WY 1989 | 0.1 | 0.1 | 0.1 | 0.1 | 1.3 | 8.8 | 6.6 | 20.5 | 22.7 | 2.8 | 0.2 | 0.1 | 63.2 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1982 thru 1989 | 6.79 | 2.86 | 4.01 | 1.22 | 2.86 | 2.45 | 1.90 | 4.18 | 6.45 | 0.98 | 1.39 | 5.13 | 40.21 |
| WY 1989 | 1.46 | 1.95 | 2.80 | 2.72 | 3.11 | 3.66 | 2.99 | 5.71 | 7.63 | 2.74 | 2.64 | 2.80 | 40.21 |
| Deviation | -5.33 | -0.91 | -1.21 | 1.50 | 0.25 | 1.21 | 1.09 | 1.53 | 1.18 | 1.76 | 1.25 | -2.33 | 0.00 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 535.54 | 535.62 | 535.74 | 536.39 | 538.84 | 539.31 | 538.02 | 540.14 | 538.72 | 537.70 | 537.52 | 537.16 | |
| Maximum | 535.92 | 535.71 | 535.76 | 536.39 | 538.86 | 539.50 | 539.31 | 543.69 | 543.97 | 538.80 | 537.87 | 537.55 | |
| Minimum | 535.52 | 535.33 | 535.58 | 535.62 | 536.37 | 537.78 | 538.02 | 538.02 | 538.72 | 537.70 | 537.52 | 537.16 | |
| Pool Content EOM (1000 AC. FT.) | 46.22 | 46.46 | 46.82 | 48.81 | 56.89 | 59.12 | 54.09 | 61.56 | 56.48 | 53.02 | 52.43 | 51.25 | |

## BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WACO LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1907 thru 1989 | 23.6 | 15.2 | 20.3 | 16.9 | 23.7 | 26.1 | 43.6 | 66.5 | 34.2 | 12.9 | 7.7 | 15.8 | 306.6 |
| WY 1989 | 3.3 | 3.0 | 4.1 | 10.5 | 29.8 | 64.0 | 29.8 | 138.1 | 130.9 | 13.6 | 15.7 | 3.9 | 446.6 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1966 thru 1989 | 7.1 | 10.6 | 11.6 | 14.4 | 16.8 | 26.2 | 29.4 | 59.2 | 42.0 | 12.1 | 2.6 | 4.5 | 236.5 |
| WY 1989 | 0.1 | 0.1 | 0.1 | 0.1 | 13.4 | 29.8 | 53.3 | 102.8 | 153.5 | 9.5 | 5.9 | 0.1 | 368.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 3.67 | 2.61 | 2.16 | 1.73 | 2.26 | 2.51 | 3.25 | 4.99 | 3.07 | 2.27 | 2.31 | 3.52 | 34.36 |
| WY 1989 | 1.36 | 1.67 | 2.72 | 3.40 | 2.96 | 2.93 | 1.75 | 10.04 | 4.92 | 3.03 | 3.03 | 0.11 | 37.92 |
| Deviation | -2.31 | -0.94 | 0.56 | 1.67 | 0.70 | 0.42 | -1.50 | 5.05 | 1.85 | 0.76 | 0.72 | -3.41 | 3.56 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 452.35 | 452.05 | 452.17 | 453.24 | 455.17 | 459.19 | 455.40 | 459.26 | 455.44 | 454.95 | 455.21 | 454.71 | |
| Maximum | 452.80 | 452.35 | 452.17 | 453.24 | 456.75 | 460.18 | 459.19 | 466.47 | 463.17 | 455.62 | 455.98 | 455.21 | |
| Minimum | 452.28 | 452.02 | 451.96 | 452.17 | 453.24 | 455.03 | 455.13 | 455.16 | 455.36 | 454.95 | 454.95 | 454.71 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1000 AC. FT.) | 130.51 | 128.46 | 129.28 | 136.67 | 150.42 | 180.69 | 152.09 | 181.24 | 152.38 | 148.83 | 150.71 | 147.10 | |



BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROCTOR LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1922 thru 1989 | 3.4 | 1.8 | 1.5 | 3.5 | 2.7 | 4.9 | 5.1 | 13.5 | 10.1 | 2.7 | 1.4 | 2.9 | 53.7 |
| WY 1989 | 0.8 | 0.6 | 0.8 | 1.3 | 4.3 | 1.8 | 2.2 | 54.1 | 83.7 | 17.8 | 23.0 | 15.2 | 205.7 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 2.6 | 2.1 | 2.1 | 3.3 | 5.4 | 4.7 | 7.7 | 9.7 | 15.3 | 15.1 | 6.0 | 3.6 | 77.6 |
| WY 1989 | 0.7 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 10.0 | 57.2 | 45.4 | 26.3 | 22.6 | 163.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 2.83 | 1.94 | 1.40 | 1.45 | 1.78 | 2.12 | 2.87 | 4.77 | 3.50 | 1.55 | 2.24 | 3.58 | 30.02 |
| WY 1989 | 0.97 | 1.10 | 1.28 | 2.33 | 3.73 | 2.09 | 1.34 | 4.52 | 5.71 | 0.07 | 3.08 | 2.03 | 28.25 |
| Deviation | -1.86 | -0.84 | -0.12 | 0.88 | 1.95 | -0.03 | -1.53 | -0.25 | 2.21 | -1.48 | 0.84 | -1.55 | -1.77 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 1159.38 | 1159.05 | 1158.94 | 1158.96 | 1159.85 | 1159.89 | 1159.87 | 1167.97 | 1171.50 | 1166.10 | 1164.55 | 1162.26 | |
| Maximum | 1159.86 | 1159.38 | 1159.06 | 1158.98 | 1159.88 | 1159.91 | 1160.00 | 1168.93 | 1174.90 | 1171.50 | 1167.21 | 1164.55 | |
| Minimum | 1159.29 | 1159.05 | 1158.93 | 1158.86 | 1158.89 | 1159.75 | 1159.72 | 1159.83 | 1167.58 | 1166.10 | 1164.55 | 1162.26 | |
| Pool Content EOM | | | | | | | | | | | | | |
| (1000 AC. FT.) | 48.10 | 46.79 | 46.36 | 46.44 | 50.00 | 50.17 | 50.09 | 90.99 | 113.51 | 80.21 | 71.89 | 60.60 | |

BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BELTON LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1908 thru 1989 | 30.1 | 20.2 | 29.9 | 29.5 | 34.8 | 37.0 | 59.9 | 97.0 | 52.3 | 24.8 | 14.0 | 24.9 | 454.3 |
| WY 1989 | 5.8 | 3.6 | 3.4 | 13.7 | 23.2 | 40.7 | 20.4 | 88.8 | 110.6 | 40.3 | 25.1 | 14.0 | 389.5 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1955 thru 1989 | 21.8 | 20.2 | 17.6 | 24.9 | 24.1 | 33.8 | 29.0 | 53.7 | 62.7 | 49.1 | 17.5 | 11.0 | 365.4 |
| WY 1989 | 3.0 | 1.9 | 1.5 | 1.1 | 0.8 | 2.1 | 1.2 | 54.5 | 120.5 | 32.7 | 16.5 | 6.4 | 242.3 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1954 thru 1989 | 3.80 | 2.51 | 1.96 | 1.75 | 2.36 | 2.14 | 3.19 | 4.48 | 3.63 | 1.90 | 2.32 | 3.56 | 33.59 |
| WY 1989 | 1.93 | 0.94 | 2.49 | 4.11 | 4.33 | 3.11 | 0.65 | 5.21 | 6.02 | 0.37 | 3.53 | 0.50 | 33.19 |
| Deviation | -1.87 | -1.57 | 0.53 | 2.36 | 1.97 | 0.97 | -2.54 | 0.73 | 2.39 | -1.53 | 1.21 | -3.06 | -0.40 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 588.59 | 588.16 | 587.97 | 588.76 | 590.46 | 593.30 | 594.30 | 596.35 | 594.88 | 594.55 | 594.32 | 594.07 | |
| Maximum | 589.15 | 588.59 | 588.16 | 588.76 | 590.46 | 593.30 | 594.30 | 599.34 | 598.26 | 594.90 | 594.85 | 594.32 | |
| Minimum | 588.47 | 588.09 | 587.96 | 587.84 | 588.76 | 590.46 | 593.30 | 594.26 | 594.84 | 594.51 | 594.32 | 594.07 | |
| Pool Content EOM (1000 AC. FT.) | 378.17 | 373.39 | 371.30 | 380.08 | 399.51 | 433.35 | 445.72 | 471.86 | 453.02 | 448.86 | 445.97 | 442.85 | |



BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **STILLHOUSE HOLLOW LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 13.3 | 9.3 | 12.7 | 15.0 | 20.9 | 22.1 | 24.2 | 42.9 | 16.4 | 10.0 | 4.3 | 9.9 | 201.1 |
| WY 1989 | 1.2 | 0.9 | 1.3 | 4.5 | 4.7 | 7.4 | 5.4 | 28.8 | 15.1 | 3.1 | 2.1 | 0.0 | 74.4 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1968 thru 1989 | 6.8 | 7.3 | 8.3 | 14.1 | 11.6 | 14.9 | 16.5 | 28.4 | 22.8 | 24.6 | 3.7 | 5.2 | 164.2 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1967 thru 1989 | 3.57 | 2.44 | 1.95 | 1.70 | 2.49 | 2.46 | 2.84 | 4.58 | 3.75 | 2.10 | 2.43 | 3.38 | 33.68 |
| WY 1989 | 0.53 | 1.06 | 2.05 | 4.69 | 3.79 | 2.62 | 0.59 | 5.46 | 4.68 | 0.92 | 3.03 | 0.27 | 29.69 |
| Deviation | -3.04 | -1.38 | 0.10 | 2.99 | 1.30 | 0.16 | -2.25 | 0.88 | 0.93 | -1.18 | 0.60 | -3.11 | -3.99 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 610.65 | 610.36 | 610.41 | 611.04 | 611.75 | 612.80 | 613.33 | 617.84 | 619.75 | 619.44 | 619.01 | 618.28 | |
| Maximum | 611.01 | 610.65 | 610.44 | 611.04 | 611.75 | 612.80 | 613.33 | 617.84 | 619.75 | 619.80 | 619.50 | 619.01 | |
| Minimum | 610.57 | 610.36 | 610.31 | 610.38 | 611.00 | 611.75 | 612.80 | 613.32 | 617.84 | 619.44 | 619.01 | 618.28 | |
| Pool Content EOM (1000 AC. FT.) | 170.39 | 168.93 | 169.18 | 172.37 | 176.03 | 181.54 | 184.38 | 209.92 | 221.51 | 219.60 | 216.97 | 212.55 | |

## BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GEORGETOWN LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1980 thru 1989 | 10.9 | 7.2 | 16.1 | 8.6 | 17.1 | 15.2 | 6.9 | 21.5 | 38.1 | 14.2 | 3.3 | 7.4 | 166.4 |
| WY 1989 | 0.5 | 0.0 | 0.1 | 0.7 | 0.6 | 3.0 | 1.5 | 14.2 | 3.8 | 0.4 | 0.2 | 0.0 | 25.0 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1980 thru 1989 | 1.5 | 1.3 | 3.7 | 2.7 | 4.8 | 6.5 | 2.2 | 4.6 | 7.5 | 12.0 | 0.6 | 2.8 | 50.1 |
| WY 1989 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 9.0 | 4.0 | 0.2 | 0.2 | 0.2 | 15.4 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1981 thru 1989 | 4.62 | 3.55 | 2.35 | 1.38 | 2.58 | 2.54 | 1.88 | 5.05 | 5.18 | 1.42 | 1.87 | 2.66 | 35.09 |
| WY 1989 | 1.16 | 0.87 | 1.35 | 4.24 | 1.67 | 3.35 | 1.03 | 4.64 | 3.90 | 0.80 | 2.31 | 0.72 | 25.04 |
| Deviation | -3.46 | -2.68 | -1.00 | 2.86 | -0.91 | 0.81 | -0.85 | -0.41 | -1.28 | -0.62 | 0.44 | -1.94 | -9.05 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 787.76 | 786.88 | 786.22 | 786.23 | 786.27 | 788.18 | 788.74 | 792.13 | 791.33 | 790.53 | 789.58 | 788.36 | |
| Maximum | 788.79 | 787.76 | 786.88 | 786.24 | 786.27 | 788.18 | 788.74 | 796.69 | 792.37 | 791.38 | 790.53 | 789.58 | |
| Minimum | 787.72 | 786.88 | 786.22 | 785.94 | 786.02 | 786.27 | 788.18 | 788.72 | 791.28 | 790.53 | 789.58 | 788.36 | |
| Pool Content EOM (1000 AC. FT.) | 33.04 | 32.01 | 31.25 | 31.26 | 31.31 | 33.54 | 34.22 | 38.58 | 37.52 | 36.47 | 35.26 | 33.76 | |



## BRAZOS RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GRANGER LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1980 thru 1989 | 11.3 | 8.2 | 16.8 | 9.2 | 17.7 | 15.7 | 7.3 | 24.8 | 39.2 | 14.4 | 3.5 | 7.5 | 175.5 |
| WY 1989 | 1.1 | 1.1 | 2.2 | 2.8 | 1.7 | 4.0 | 2.8 | 43.5 | 7.8 | 2.2 | 1.4 | 0.1 | 70.6 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1980 thru 1989 | 5.8 | 6.8 | 13.0 | 11.5 | 12.0 | 16.3 | 7.1 | 16.4 | 27.1 | 27.2 | 2.6 | 6.3 | 152.0 |
| WY 1989 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 20.3 | 25.2 | 10.4 | 0.2 | 0.2 | 48.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1981 thru 1989 | 4.07 | 2.65 | 2.84 | 1.31 | 1.84 | 2.31 | 1.29 | 5.32 | 5.82 | 1.23 | 1.23 | 1.97 | 31.97 |
| WY 1989 | 2.03 | 0.37 | 2.91 | 2.60 | 1.02 | 2.28 | 1.16 | 6.01 | 5.16 | 0.70 | 1.54 | 0.33 | 26.11 |
| Deviation | -2.04 | -2.28 | 0.07 | 1.29 | -0.82 | -0.03 | -0.13 | 0.69 | -0.66 | -0.53 | 0.31 | -1.64 | -5.76 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 502.66 | 502.43 | 502.65 | 503.09 | 503.31 | 503.93 | 504.15 | 508.43 | 504.40 | 504.16 | 503.81 | 503.16 | |
| Maximum | 502.96 | 502.66 | 502.65 | 503.09 | 503.31 | 503.93 | 504.15 | 510.81 | 508.43 | 504.41 | 504.25 | 503.81 | |
| Minimum | 502.61 | 502.43 | 502.41 | 502.64 | 503.07 | 503.31 | 503.91 | 504.15 | 504.40 | 504.16 | 503.81 | 503.16 | |
| Pool Content EOM (1000 AC. FT.) | 59.88 | 58.96 | 59.84 | 61.63 | 62.54 | 65.20 | 66.17 | 86.93 | 67.28 | 66.21 | 64.68 | 61.92 | |

COLORADO RIVER BASIN

SOMERVILLE LAKE

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1924 thru 1989 | 12.5 | 15.0 | 16.8 | 20.8 | 23.4 | 19.5 | 25.8 | 36.2 | 25.3 | 11.5 | 3.6 | 9.2 | 219.5 |
| WY 1989 | 2.6 | 1.3 | 3.6 | 16.5 | 3.3 | 16.9 | 4.8 | 19.3 | 16.7 | 5.0 | 5.2 | 0.6 | 95.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1967 thru 1989 | 7.7 | 9.0 | 18.9 | 11.7 | 17.6 | 17.2 | 18.9 | 25.9 | 31.0 | 23.7 | 6.9 | 4.5 | 192.9 |
| WY 1989 | 0.0 | 0.0 | 8.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 6.2 | 0.0 | 0.0 | 24.1 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1967 thru 1989 | 3.93 | 3.07 | 2.56 | 2.76 | 2.39 | 2.57 | 2.85 | 5.00 | 3.90 | 1.83 | 2.30 | 4.04 | 37.20 |
| WY 1989 | 1.98 | 0.86 | 1.79 | 6.35 | 0.84 | 3.71 | 2.13 | 3.35 | 5.72 | 2.39 | 3.93 | 2.68 | 36.33 |
| Deviation | -1.95 | -2.21 | -0.77 | 4.09 | -1.55 | 1.14 | -0.72 | -1.65 | 1.82 | 0.56 | 1.63 | -1.36 | -0.97 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 234.98 | 234.73 | 233.97 | 235.49 | 235.65 | 237.00 | 237.10 | 238.35 | 238.58 | 237.88 | 237.67 | 237.16 | |
| Maximum | 235.23 | 234.98 | 234.79 | 235.49 | 235.65 | 237.00 | 237.16 | 238.49 | 239.04 | 238.58 | 238.16 | 237.67 | |
| Minimum | 234.91 | 234.73 | 233.95 | 233.95 | 235.49 | 235.62 | 236.91 | 237.06 | 238.22 | 237.88 | 237.67 | 237.16 | |
| Pool Content EOM (1000 AC. FT.) | 127.72 | 125.23 | 117.83 | 132.89 | 134.54 | 148.90 | 150.00 | 164.15 | 166.84 | 158.74 | 156.35 | 150.66 | |

## COLORADO RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TWIN BUTTES LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 6.9 | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 | 5.2 | 8.0 | 4.5 | 2.3 | 6.3 | 8.3 | 60.6 |
| WY 1989 | 1.4 | 1.7 | 3.5 | 3.5 | 5.5 | 5.6 | 4.0 | 2.4 | 2.4 | 1.2 | 2.8 | 2.8 | 36.8 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 1.4 | 1.5 | 1.4 | 0.9 | 1.1 | 1.7 | 2.9 | 4.6 | 3.6 | 5.5 | 4.2 | 1.8 | 30.5 |
| WY 1989 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.1 | 2.5 | 4.2 | 3.7 | 8.9 | 7.5 | 2.3 | 29.5 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 2.02 | 0.90 | 0.64 | 0.57 | 1.02 | 0.86 | 1.36 | 2.46 | 1.98 | 1.02 | 1.60 | 2.76 | 17.20 |
| WY 1989 | 0.05 | 0.00 | 0.14 | 0.01 | 0.97 | 0.41 | 1.17 | 1.27 | 1.19 | 0.10 | 0.39 | 0.29 | 5.99 |
| Deviation | -1.97 | -0.90 | -0.50 | -0.56 | -0.05 | -0.45 | -0.19 | -1.19 | -0.79 | -0.92 | -1.21 | -2.47 | -11.21 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 1933.70 | 1933.39 | 1933.62 | 1933.84 | 1934.44 | 1934.80 | 1934.45 | 1933.53 | 1932.64 | 1930.48 | 1928.78 | 1928.20 | |
| Maximum | 1934.04 | 1933.70 | 1933.62 | 1933.84 | 1934.44 | 1934.80 | 1934.80 | 1934.47 | 1933.53 | 1932.64 | 1930.48 | 1928.78 | |
| Minimum | 1933.70 | 1933.39 | 1933.39 | 1933.62 | 1933.84 | 1934.44 | 1934.45 | 1933.53 | 1932.64 | 1930.48 | 1928.78 | 1928.20 | |
| Pool Content EOM (1000 AC. FT.) | 126.10 | 123.96 | 125.54 | 127.07 | 131.30 | 133.90 | 131.37 | 124.92 | 118.92 | 105.42 | 96.87 | 94.12 | |

## COLORADO RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **O. C. FISHER LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1915 thru 1989 | 3.8 | 0.4 | 0.4 | 0.3 | 0.5 | 1.1 | 3.7 | 5.7 | 2.7 | 3.0 | 1.6 | 6.9 | 30.0 |
| WY 1989 | 0.1 | 0.3 | 0.4 | 0.6 | 1.1 | 1.1 | 0.8 | 0.9 | 2.2 | 0.3 | 0.7 | 0.4 | 8.8 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 1.6 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 0.3 | 0.5 | 0.5 | 0.3 | 4.4 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 2.54 | 1.06 | 0.86 | 0.74 | 1.00 | 0.94 | 1.84 | 3.18 | 2.27 | 1.64 | 2.11 | 2.99 | 21.18 |
| WY 1989 | 0.01 | 0.00 | 1.11 | 0.60 | 3.32 | 1.48 | 1.41 | 1.29 | 3.70 | 0.28 | 1.57 | 2.04 | 16.81 |
| Deviation | -2.53 | -1.06 | 0.25 | -0.14 | 2.32 | 0.54 | -0.43 | -1.89 | 1.43 | -1.36 | -0.54 | -0.95 | -4.37 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 1891.14 | 1890.53 | 1890.20 | 1889.93 | 1889.97 | 1889.75 | 1889.28 | 1888.56 | 1888.47 | 1887.36 | 1886.58 | 1885.88 | |
| Maximum | 1891.92 | 1891.14 | 1890.53 | 1890.20 | 1890.02 | 1889.97 | 1889.75 | 1889.29 | 1888.93 | 1888.47 | 1887.36 | 1886.58 | |
| Minimum | 1891.14 | 1890.53 | 1890.20 | 1889.93 | 1889.79 | 1889.70 | 1889.26 | 1888.56 | 1888.32 | 1887.36 | 1886.58 | 1885.88 | |
| Pool Content EOM (1000 AC. FT.) | 49.86 | 48.11 | 47.18 | 46.42 | 46.53 | 45.92 | 44.63 | 42.69 | 42.45 | 39.58 | 37.65 | 35.98 | |

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HORDS CREEK LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1942 thru 1989 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 1.0 | 0.4 | 0.2 | 0.1 | 0.3 | 3.3 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.3 | 0.9 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1952 thru 1989 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.7 |
| WY 1989 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1949 thru 1989 | 2.61 | 1.43 | 1.01 | 1.14 | 1.15 | 1.33 | 2.44 | 3.77 | 3.09 | 1.87 | 2.10 | 3.25 | 25.18 |
| WY 1989 | 0.98 | 0.03 | 1.14 | 0.61 | 3.64 | 0.76 | 1.29 | 5.02 | 3.74 | 1.12 | 1.01 | 3.38 | 22.22 |
| Deviation | -1.63 | -1.40 | 0.13 | -0.53 | 2.49 | -0.57 | -1.15 | 1.25 | 0.65 | -0.75 | -1.09 | 0.63 | -1.96 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 1890.86 | 1890.30 | 1890.06 | 1889.81 | 1889.95 | 1889.70 | 1889.22 | 1889.57 | 1889.08 | 1888.17 | 1887.24 | 1887.71 | |
| Maximum | 1891.41 | 1890.86 | 1890.30 | 1890.06 | 1890.01 | 1889.95 | 1889.70 | 1889.89 | 1889.57 | 1889.08 | 1888.17 | 1888.07 | |
| Minimum | 1890.78 | 1890.30 | 1890.06 | 1889.81 | 1889.68 | 1889.70 | 1889.22 | 1889.03 | 1889.08 | 1888.17 | 1887.24 | 1886.96 | |
| Pool Content EOM (1000 AC. FT.) | 4.42 | 4.24 | 4.17 | 4.10 | 4.14 | 4.07 | 3.93 | 4.03 | 3.89 | 3.64 | 3.40 | 3.52 | |





| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MARSHALL FORD LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1941 thru 1989 | 125.4 | 61.4 | 57.1 | 76.6 | 78.0 | 84.7 | 112.2 | 218.8 | 178.8 | 93.4 | 82.0 | 104.7 | 1273.1 |
| WY 1989 | 65.5 | 10.6 | 12.2 | 47.9 | 40.9 | 33.4 | 23.9 | 102.7 | 118.2 | 19.6 | 78.1 | 61.3 | 614.2 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1944 thru 1989 | 67.6 | 60.3 | 47.4 | 47.4 | 50.3 | 69.7 | 95.1 | 163.0 | 186.7 | 128.3 | 114.4 | 82.4 | 1112.6 |
| WY 1989 | 42.2 | 13.9 | 15.0 | 17.8 | 16.9 | 31.8 | 61.0 | 78.1 | 112.1 | 97.1 | 88.3 | 98.9 | 673.0 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1952 thru 1989 | 3.23 | 1.92 | 1.41 | 1.23 | 1.74 | 1.55 | 2.63 | 4.28 | 3.27 | 1.80 | 2.13 | 3.10 | 22.29 |
| WY 1989 | 1.65 | 0.00 | 1.72 | 4.60 | 0.82 | 2.10 | 2.43 | 7.94 | 3.62 | 3.02 | 0.47 | 3.39 | 25.76 |
| Deviation | -1.58 | -1.92 | 0.31 | 3.37 | -0.92 | 0.55 | -0.20 | 3.66 | 0.35 | -1.78 | -1.66 | -2.71 | -2.53 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 669.17 | 668.50 | 668.00 | 669.70 | 670.05 | 669.93 | 667.25 | 668.28 | 668.13 | 662.40 | 661.02 | 657.75 | |
| Maximum | 669.17 | 669.17 | 668.51 | 669.72 | 670.05 | 670.55 | 669.94 | 670.06 | 668.78 | 668.13 | 662.42 | 661.02 | |
| Minimum | 667.80 | 668.50 | 668.00 | 667.83 | 668.68 | 669.78 | 667.25 | 665.81 | 665.95 | 662.40 | 661.01 | 657.75 | |
| Pool Content EOM (1000 AC. FT.) | 964.30 | 953.52 | 945.54 | 972.88 | 978.57 | 976.62 | 933.65 | 950.00 | 947.61 | 859.37 | 839.05 | 792.31 | |

## GUADALUPE RIVER BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CANYON LAKE** | | | | | | | | | | | | | |
| Inflows(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1915 thru 1989 | 30.8 | 16.5 | 18.4 | 20.6 | 21.1 | 23.4 | 29.9 | 38.6 | 35.3 | 23.5 | 18.0 | 25.8 | 301.8 |
| WY 1989 | 10.3 | 7.1 | 7.9 | 15.3 | 12.7 | 14.8 | 13.8 | 13.3 | 8.6 | 4.5 | 4.0 | 4.0 | 116.3 |
| Releases(1000 AC.FT) | | | | | | | | | | | | | |
| Avg 1959 thru 1989 | 19.1 | 18.6 | 14.4 | 17.9 | 17.9 | 19.7 | 20.9 | 24.0 | 31.5 | 30.8 | 28.8 | 17.2 | 261.0 |
| WY 1989 | 9.0 | 6.2 | 6.4 | 4.5 | 3.0 | 1.8 | 1.1 | 0.6 | 0.0 | 0.8 | 3.6 | 4.4 | 41.6 |
| Rainfall (inches) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 3.49 | 2.64 | 1.78 | 1.91 | 1.95 | 1.84 | 2.72 | 4.44 | 3.53 | 2.05 | 3.01 | 4.11 | 33.38 |
| WY 1989 | .47 | 0.09 | 0.86 | 4.55 | 0.59 | 1.93 | 1.92 | 2.60 | 4.32 | 0.41 | 1.56 | 1.24 | 21.53 |
| Deviation | -2.02 | -2.55 | -0.92 | 2.64 | -1.27 | 0.09 | -0.80 | -1.84 | 0.79 | -1.64 | -1.45 | -2.87 | -11.85 |
| Pool Elevation | | | | | | | | | | | | | |
| End of Month | 908.60 | 908.28 | 908.22 | 908.90 | 908.70 | 908.43 | 908.20 | 907.79 | 907.36 | 906.33 | 905.62 | 904.86 | |
| Maximum | 908.96 | 908.60 | 908.28 | 908.90 | 908.94 | 908.70 | 908.43 | 908.34 | 907.79 | 907.36 | 906.33 | 905.62 | |
| Minimum | 908.56 | 908.28 | 908.20 | 908.16 | 908.59 | 908.28 | 908.06 | 907.79 | 907.36 | 906.33 | 905.62 | 904.86 | |
| Pool Content EOM (1000 AC. FT.) | 378.72 | 376.10 | 375.61 | 381.18 | 379.53 | 377.33 | 375.45 | 372.12 | 368.65 | 360.42 | 354.80 | 348.84 | |

COLORADO RIVER BASIN

NAVAJO DAM

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) FY 1989 | 28.56 | 12.83 | 15.57 | 17.23 | 27.26 | 135.68 | 161.85 | 135.44 | 83.85 | 43.00 | 43.12 | 24.60 | 728.99 |
| Releases (1000 Ac-Ft) FY 1989 | 37.20 | 36.00 | 37.20 | 37.20 | 33.60 | 37.20 | 36.00 | 37.20 | 36.09 | 37.38 | 37.20 | 36.00 | 438.27 |
| Rainfall (Inches) | Data Unavailable | | | | | | | | | | | | |
| Pool Elevation (EOM) | 6047.80 | 6045.69 | 6043.71 | 6041.85 | 6041.21 | 6049.35 | 6058.22 | 6063.64 | 6064.27 | 6061.80 | 6059.73 | 6057.30 | |
| Maximum | 6049.40 | 6047.42 | 6045.65 | 6043.64 | 6041.80 | 6049.35 | 6058.22 | 6063.64 | 6064.81 | 6064.20 | 6062.18 | 6059.61 | |
| Minimum | 6047.80 | 6045.69 | 6043.71 | 6041.85 | 6040.84 | 6041.29 | 6049.61 | 6058.29 | 6063.82 | 6061.80 | 6059.73 | 6057.30 | |
| Pool Content (EOM) (1000 Ac-Ft) | 1196.47 | 1172.44 | 1150.27 | 1129.78 | 1122.80 | 1214.39 | 1321.45 | 1390.78 | 1399.04 | 1366.89 | 1340.46 | 1309.99 | |

[1]

PLATORO RESERVOIR

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| FY 1989 | .43 | .32 | .30 | .46 | .56 | 1.31 | 7.07 | 19.06 | 15.16 | 4.05 | 3.34 | 1.58 | 53.64 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| FY 1989 | .50 | .16 | .15 | .31 | .28 | .30 | 4.36 | 18.84 | 18.43 | 11.92 | 4.99 | 2.41 | 62.65 |
| Rainfall (Inches) | DATA IS NOT AVAILABLE | | | | | | | | | | | | |
| Pool Elevation(EOM) | 9997.1 | 9997.3 | 9997.7 | 9997.89 | 9998.30 | 9999.73 | 10003.47 | 10003.63 | 9998.68 | 9986.23 | 9983.41 | 9981.94 | |
| Maximum | 9997.5 | 9997.3 | 9997.7 | 9997.89 | 9998.36 | 9999.84 | 10003.80 | 10004.05 | 10003.25 | 9998.49 | 9986.77 | 9983.29 | |
| Minimum | 9997.0 | 9997.0 | 9997.3 | 9997.67 | 9997.86 | 9998.33 | 9999.79 | 10002.82 | 9998.68 | 9986.23 | 9983.41 | 9981.94 | |
| Pool Content (EOM) (1000 Ac-Ft) | 28.97 | 29.06 | 29.33 | 29.49 | 29.77 | 30.78 | 33.48 | 33.60 | 30.04 | 21.93 | 20.27 | 19.43 | |

ABIQUIU DAM

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1926 thru 1989 | 11.99 | 13.68 | 12.09 | 5.46 | 9.71 | 19.80 | 51.77 | 95.84 | 52.31 | 26.00 | 25.62 | 18.00 | 342.28 |
| FY 1989 | 6.36 | 6.47 | 6.90 | 7.11 | 8.18 | 26.41 | 99.39 | 37.29 | 24.77 | 37.67 | 25.04 | 17.69 | 303.32 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1963 thru 1989 | 13.10 | 22.25 | 21.03 | 10.42 | 12.23 | 23.23 | 47.94 | 66.79 | 54.28 | 32.47 | 24.35 | 17.65 | 345.77 |
| FY 1989 | 6.19 | 7.56 | 3.47 | 3.31 | 3.03 | 33.11 | 89.45 | 47.59 | 26.26 | 45.63 | 32.98 | 16.55 | 314.13 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1957 thru 1989 | .94 | .51 | .36 | .39 | .27 | .54 | .54 | .81 | .72 | 1.67 | 1.96 | 1.16 | 9.87 |
| FY 1989 | .50 | .35 | .0 | .10 | .10 | .03 | .01 | .48 | .30 | 2.03 | 1.60 | .80 | 6.30 |
| Pool Elevation (EOM) | 6218.50 | 6218.01 | 6218.73 | 6219.58 | 6220.79 | 6218.81 | 6220.64 | 6217.40 | 6216.60 | 6213.94 | 6211.35 | 6211.20 | |
| Maximum | 6218.74 | 6218.50 | 6218.73 | 6219.58 | 6220.79 | 6221.69 | 6221.34 | 6220.41 | 6217.35 | 6216.57 | 6214.37 | 6211.20 | |
| Minimum | 6218.50 | 6217.69 | 6218.04 | 6218.75 | 6919.60 | 6218.81 | 6218.36 | 6216.85 | 6216.60 | 6213.13 | 6211.35 | 6210.55 | |
| Pool Content (EOM) (1000 Ac-Ft) | 185.18 | 183.19 | 186.11 | 189.58 | 194.58 | 186.44 | 193.96 | 180.73 | 177.53 | 167.08 | 157.16 | 156.59 | |

[1] Data for compiling averages unavailable

COCHITI LAKE

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1910 thru 1989 | 49.20 | 54.66 | 48.89 | 41.59 | 47.61 | 81.46 | 139.65 | 270.05 | 202.34 | 85.43 | 57.34 | 44.21 | 1122.45 |
| FY 1989 | 41.68 | 46.21 | 43.16 | 48.19 | 48.44 | 125.46 | 201.40 | 110.23 | 55.90 | 65.36 | 52.08 | 35.84 | 873.95 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1975 thru 1989 | 39.74 | 52.79 | 56.47 | 52.06 | 62.24 | 90.70 | 146.84 | 226.79 | 206.86 | 134.54 | 65.62 | 47.93 | 1182.60 |
| FY 1989 | 39.29 | 47.33 | 42.97 | 48.15 | 48.15 | 117.77 | 209.04 | 108.62 | 56.64 | 61.97 | 52.17 | 34.57 | 866.67 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1967 thru 1989 | 1.15 | .71 | .60 | .62 | .42 | .65 | .68 | .94 | .76 | 1.84 | 2.21 | 1.61 | 12.18 |
| FY 1989 | .32 | .26 | .15 | .80 | .75 | .61 | .0 | .23 | .07 | 3.04 | 1.12 | 1.63 | 8.98 |
| Pool Elevation (EOM) | 5333.87 | 5332.73 | 5332.74 | 5332.77 | 5332.94 | 5338.33 | 5331.77 | 5332.30 | 5330.81 | 5332.91 | 5332.25 | 5332.72 | |
| Maximum | 5333.87 | 5338.32 | 5333.00 | 5333.01 | 5333.48 | 5340.40 | 5339.62 | 5332.42 | 5332.52 | 5332.91 | 5332.96 | 5332.90 | |
| Minimum | 5331.82 | 5332.63 | 5332.39 | 5332.45 | 5332.38 | 5332.25 | 5331.77 | 5331.51 | 5330.90 | 5330.29 | 5332.11 | 5331.62 | |
| Pool Content (EOM) (1000 Ac-Ft) | 52.15 | 50.70 | 50.72 | 50.75 | 50.97 | 58.05 | 49.55 | 50.18 | 48.44 | 50.93 | 50.19 | 50.70 | |

GALISTEO DAM

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | | | | | | | | | | | | | |
| FY 1989 | INFLOW = OUTFLOW | | | | | | | | | | | | |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | .41 | .09 | .08 | .07 | .10 | .16 | .21 | .27 | .24 | 1.19 | .96 | .67 | 4.46 |
| FY 1989 | .23 | .07 | .03 | .01 | .07 | .24 | .18 | .01 | .0 | 2.11 | .79 | .05 | 3.80 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1971 thru 1989 | 1.08 | .65 | .39 | .45 | .55 | .45 | .70 | .82 | .60 | 1.52 | 1.66 | 1.27 | 10.16 |
| FY 1989 | .32 | .53 | .05 | .55 | .58 | .43 | .15 | .0 | .03 | 2.51 | 1.23 | 1.35 | 7.73 |
| Pool Elevation (EOM) | NO END OF MONTH STORAGE DURING THE YEAR | | | | | | | | | | | | |
| Maximum | | | | | | | | | | | | | |
| Minimum | | | | | | | | | | | | | |
| Pool Content (EOM) (1000 Ac-Ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

JEMEZ CANYON DAM

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1921 thru 1989 | 2.42 | 1.85 | 1.60 | 1.66 | 1.94 | 4.38 | 18.13 | 14.84 | 2.86 | 1.29 | 2.44 | 1.67 | 55.10 |
| FY 1989 | 3.25 | 2.14 | 1.79 | 2.19 | 2.34 | 13.28 | 9.87 | 1.08 | .42 | 1.70 | 2.62 | .26 | 40.94 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1954 thru 1989 | 2.01 | 1.95 | 1.39 | 1.56 | 1.74 | 3.97 | 11.00 | 12.36 | 6.03 | 2.92 | 2.80 | 1.53 | 49.25 |
| FY 1989 | 3.23 | .16 | .79 | 1.57 | 2.37 | 9.80 | 11.37 | .68 | .35 | .87 | 3.12 | .26 | 34.57 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1953 thru 1989 | 1.03 | .48 | .43 | .39 | .36 | .46 | .43 | .63 | .56 | 1.34 | 1.57 | 1.17 | 8.85 |
| FY 1989 | .37 | .25 | .0 | .63 | .35 | .23 | .0 | .14 | .11 | 2.75 | 1.39 | .27 | 6.49 |
| Pool Elevation (EOM) | 5194.39 | 5195.59 | 5196.15 | 5196.50 | 5196.23 | 5198.21 | 5196.43 | 5195.67 | 5194.46 | 5194.04 | 5192.80 | 5191.88 | |
| Maximum | 5194.84 | 5195.59 | 5196.54 | 5196.71 | 5196.59 | 5198.88 | 5198.06 | 5196.41 | 5195.59 | 5194.44 | 5194.42 | 5192.77 | |
| Minimum | 5194.39 | 5194.37 | 5195.65 | 5196.17 | 5196.23 | 5196.06 | 5196.43 | 5195.67 | 5194.46 | 5193.45 | 5192.80 | 5191.88 | |
| Pool Content (EOM) (1000 Ac-Ft) | 26.25 | 27.85 | 28.61 | 29.10 | 28.72 | 31.50 | 29.00 | 27.96 | 26.35 | 25.80 | 24.22 | 23.09 | |

SANTA ROSA LAKE

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1981 thru 1989 | 3.62 | 2.26 | 1.79 | 1.75 | 2.12 | 4.78 | 8.95 | 18.34 | 16.84 | 8.15 | 13.99 | 7.94 | 90.51 |
| FY 1989 | 2.38 | 1.34 | 1.92 | 1.80 | 1.91 | 4.86 | 6.78 | 2.14 | 1.60 | 4.94 | 8.74 | 2.60 | 41.01 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1981 thru 1989 | .80 | 1.04 | .60 | .60 | .94 | 1.60 | 6.39 | 16.59 | 12.39 | 13.78 | 9.57 | 10.34 | 74.65 |
| FY 1989 | .05 | .0 | .0 | .0 | .0 | .0 | 40.57 | 41.24 | 3.94 | .0 | .0 | .0 | 85.82 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1981 thru 1989 | 1.64 | .96 | .66 | .46 | .43 | .54 | .89 | 1.57 | 2.06 | 1.70 | 3.41 | 1.85 | 16.17 |
| FY 1989 | .21 | .17 | .28 | .24 | .39 | .24 | .19 | .38 | 1.47 | 1.67 | 3.87 | 1.01 | 10.12 |
| Pool Elevation (EOM) | 4738.63 | 4738.69 | 4739.06 | 4739.39 | 4739.71 | 4740.66 | 4728.08 | 4698.66 | 4693.81 | 4701.40 | 4710.17 | 4711.99 | |
| Maximum | 4738.63 | 4738.69 | 4739.06 | 4739.39 | 4739.71 | 4740.66 | 4740.87 | 4727.26 | 4698.73 | 4701.40 | 4710.17 | 4711.99 | |
| Minimum | 4738.25 | 4738.61 | 4738.71 | 4739.07 | 4739.36 | 4739.72 | 4728.08 | 4698.15 | 4690.69 | 4693.90 | 4702.04 | 4710.19 | |
| Pool Content (EOM) (1000 Ac-Ft) | 80.08 | 80.27 | 81.45 | 82.52 | 83.56 | 86.69 | 51.23 | 10.52 | 7.84 | 12.47 | 20.77 | 22.92 | |

## SUMNER LAKE

RIO GRANDE BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| FY 1989 | Data Unavailable | | | | | | | | | | | | |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| FY 1989 | 6.94 | .16 | .01 | .16 | .98 | 3.16 | 48.42 | 63.29 | 11.04 | 5.22 | 5.18 | 4.45 | 149.01 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| FY 1989 | .18 | .02 | .24 | .39 | .59 | .14 | .26 | .38 | .95 | .72 | 4.14 | .60 | 8.61 |
| Pool Elevation (EOM) | 4244.9 | 4247.8 | 4250.8 | 4252.4 | 4254.0 | 4254.3 | 4252.4 | 4246.8 | 4243.1 | 4241.6 | 4242.8 | 4243.2 | |
| Maximum | 4244.9 | 4247.8 | 4250.8 | 4252.4 | 4254.0 | 4255.0 | 4254.3 | 4252.6 | 4246.8 | 4243.5 | 4242.8 | 4243.6 | |
| Minimum | 4244.5 | 4245.0 | 4247.8 | 4250.8 | 4252.3 | 4254.0 | 4252.1 | 4246.8 | 4243.0 | 4241.6 | 4240.5 | 4242.8 | |
| Pool Content (EOM) (1000 Ac-Ft) | 17.82 | 22.28 | 27.47 | 30.55 | 33.90 | 34.56 | 30.55 | 20.74 | 15.74 | 14.05 | 15.40 | 15.86 | |



## TWO RIVERS RESERVOIR

RIO GRANDE BASIN

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 1.09 | .91 | .80 | .86 | .71 | .88 | 1.12 | .88 | .49 | .41 | 1.38 | 1.78 | 11.31 |
| FY 1989 | .50 | .55 | 1.60 | 1.81 | 2.04 | .90 | .20 | .0 | .0 | .0 | .57 | 1.66 | 9.85 |
| Releases (1000 Ac-Ft) | | | | | | | | | | | | | |
| Avg 1964 thru 1989 | 1.09 | .90 | .80 | .87 | .71 | .88 | 1.12 | .88 | .45 | .43 | 1.38 | 1.78 | 11.29 |
| FY 1989 | .50 | .55 | 1.60 | 1.81 | 2.04 | .90 | .20 | .0 | .0 | .0 | .57 | 1.66 | 9.85 |
| Rainfall (Inches) | | | | | | | | | | | | | |
| Avg 1964 thru 1986 | .79 | .36 | .17 | .17 | .28 | .21 | .33 | .66 | 1.48 | 1.71 | 2.80 | 1.89 | 10.59 |
| FY 1989 | .02 | .0 | .26 | .10 | .32 | .03 | .04 | .26 | .09 | .80 | 3.82 | .85 | 6.59 |
| Pool Elevation (EOM) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Maximum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pool Content (EOM) (1000 AC-FT) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

BRANTLEY DAM

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflows (1000 Ac-Ft) FY 1989 | Data Unavailable | | | | | | | | | | | | |
| Releases (1000 Ac-Ft) FY 1989 | 7.89 | .58 | .93 | 1.24 | 3.46 | 7.70 | 16.91 | 15.22 | 17.13 | 15.89 | 13.37 | 9.82 | 110.24 |
| Rainfall (Inches) FY 1989 | .0 | .0 | .44 | .15 | 1.00 | .26 | .05 | .28 | .97 | .44 | 2.82 | .75 | 7.16 |
| Pool Elevation (EOM) | 3245.40 | 3245.40 | 3245.40 | 3245.70 | 3245.40 | 3247.20 | 3248.60 | 3255.40 | 3253.60 | 3247.70 | 3242.00 | 3238.90 | |
| Maximum | 3245.40 | 3245.40 | 3245.60 | 3245.70 | 3245.70 | 3248.60 | 3247.00 | 3255.40 | 3255.40 | 3253.60 | 3247.70 | 3242.00 | |
| Minimum | 3241.20 | 3245.30 | 3245.40 | 3245.40 | 3245.40 | 3245.20 | 3243.20 | 3248.60 | 3253.60 | 3247.70 | 3242.00 | 3238.90 | |
| Pool Content (EOM) (1000 Ac-Ft) | 19.05 | 19.05 | 19.05 | 19.57 | 19.05 | 22.29 | 25.05 | 42.28 | 36.98 | 23.25 | 13.87 | 10.09 | |

## SECTION VIII - MINUTES OF MEETINGS

1. RESERVOIR CONTROL CENTER
2. ARKANSAS RIVER BASIN
3. TRINITY RIVER BASIN
4. TRINITY RIVER BASIN - SEMINAR FOR LAKE OPERATORS

MINUTES

1989 ANNUAL RESERVOIR CONTROL CENTER MEETING

SOUTHWESTERN DIVISION

CORPS OF ENGINEERS

6-8 DECEMBER 1989

I. WELCOME. The 1989 Annual Reservoir Control Center (RCC) meeting was hosted by Albuquerque District in their main conference room, Albuquerque, New Mexico. Major Phillip Smith, Deputy Commander, welcomed the attendees by stating that the District is pleased to host the first meeting away from Southwestern Division office and hoped for a successful meeting. It will be apparent to most, that the District is unique because of its climate, geography, etc. At the conclusion of Major Smith's remarks, Dick Kreiner, Chief, Reservoir Control Section, gave out information on the downtown area of Albuquerque. Summarized planned activities for the group with the meeting culminating in a tour of the Rio Grande valley on 8 December 1989.

II. INTRODUCTION AND OPENING REMARKS. Mr. H. Estus Walker, Chief, Water Management Branch, Engineering Division, Southwestern Division, expressed his appreciation on behalf of the Corps of Engineers, Southwestern Division (CESWD) to the District for hosting the meeting. He commended the Districts for their efforts in the development of Drought Contingency Plans (DCP). Work is being accomplished without additional funds. He asked for continued emphasis on the DCPs, and Water Control Manual development. Feedback on agenda topics concerning the Water Control Data System (WCDS) and the NEXRAD system was solicited. He also asked that each District layout their 3 to 5 year program for reservoir system analyses studies to be conducted by the Hydrologic Modeling Center (HMC) located in the Tulsa District office. These programs are essential in order for the HMC to effectively plan its workload, funding, manpower, etc. Reorganization of the CESWDO is still in progress and will be accomplished. Currently the exact structure resulting from the reorganization is unknown. The Project Management Program is being further solidified to include the phasing in of military. However, implementation of the program is not known at this time. At this point Mr. Walker introduced Mr. Gary Eyster, who is the new Chief, Planning Branch, Albuquerque District, and first time attendee at the RCC meeting. Mr. Eyster reiterated previous statements concerning the District's pleasure of hosting the meeting. He discussed the Planning Branch structure and pointed

out that the Albuquerque District is the only District within CESWD where reservoir control responsibilities lie within the Planning Branch. Mr. Charles Sullivan, Chief, RCC, highlighted past year accomplishments such as the DCPs, Water Control Manuals, etc., and said the accomplishments were timely and well done. He summarized agenda topics and informed the group of some amendments to the agenda. The agenda and attendance list are enclosed as enclosures 1 and 2, respectively.

III. OVERVIEW-HQUSACE. Mr. Dick DeBuono began his discussion with an overview of their new organizational structure. The Hydrology and Hydraulics Branch (H&H) is back under the Civil Works Directorate. Dick thinks this is a good structure because it allows for his branch to have greater input into the policy and decision making process. Currently without Chief of Engineering due to Mr. Duscha's retirement.

a. Drought has been the focus of the H&H branch for the past two years. The Missouri and Ohio River basins have been the hardest hit. The master manual foı the Mississippi River is currently being revised because of drought conditions. Dick stressed the importance of well documented plans reflecting actual operations because of their review by the public.

b. During the on-going drought, recreation has surfaced as a key factor in reservoir regulation activities. Congressional activities also have a great influence in reservoir regulations, i.e., Section 7 Projects in the states of Alabama, Georgia, and South Carolina are being studied by the Government Audit Office (GAO). In the Southwestern Division, Lake Texoma is being studied. The goal of the GAO studies is to determine how the plan was developed, how it can be modified and what authority, etc. However, the bottom line of these studies is the concern for impact on hydropower production. Dick recommends that the public be involved in the review of water control plans. Refer to ER 240 for discussion of on public involvement. The 1944 Flood Control Act has come into play during the drought for those projects that are west of the 98 meridian. The major issue, as impacted by the Act, is that consumptive use takes priority over navigation use.

c. Mr. Page, Assistant Secretary of the Army for Civil Works, has placed emphasis on cost sharing policy as it relates to plans of regulation. In essence, his theory is that if a plan provides a benefit that is not authorized as a project purpose then the project should be credited and reimbursed for the use of its storage. The budget process is unclear as it relates to cuts that have been made in CESWD. He stated that he realizes that FY 90 money for developing Drought Contingency Plans (DCP) has not been received in CESWD. Dick will check on FY 90 money for the DCPs, and the budget process when he returns to USACE.

IV. WATER CONTROL DATA SYSTEM (WCDS).

a. WCDS-Computer Work Groups. Mr. John Parks summarized the group's activities. The purpose of the group is to evaluate means of replacing the system because of its age. Currently such an evaluation is in progress. A contract has been let to assist in this evaluation. Enclosures 3 through 6 provide details on the CEPA communications network and WCDS connection options. The attendees expressed a wide diversity of system concept as to a workstation or P.C. concept. However, it was agreed that the new system (both hardware & software) should contain the current state-of-art. Also, the work group decisions should be influenced by both the District and Division offices. CESWDO's position is not to accept any decisions of the group unless they meet the CESWD needs.

b. WCDS Master Plan. Mr. Clinton Word began his presentation by giving a brief history of the development of the plan. During the early 1970s it became evident to many Corps' offices that the present manual data collection system would have to be replaced by an automated system. Various District and Division offices began independent studies and procurement plans for this anticipated conversion. In October 1978, the Chief of Engineers instructed Water Control Managers in each division to prepare a Water Control Master Plan. This plan was to provide Justification, Approvals, and Funding documentation for future Water Control Data Management Systems. It was to provide a mechanism for moving from a labor intensive manual data collection and management system to an automated system. A task force consisting of representatives from each district and the Division office was formed to develop this Master Plan. Also, the SUTRON Corporation of Arlington, Virginia, was solicited to aid in the preparation of that portion of the Master Plan dealing with alternative solutions to SWD water control data requirements. The report concluded that we should immediately begin an orderly 5-year transition from our present outmoded operation in water control activities to a state-of-the-art automation. Our procedures were too labor intensive, slow, approximate, inflexible, and costly. Thus entered the procurement procedure which resulted in the purchase during the early '80s of the Harris 100's, 500's, DCPs, communications, etc. There was an attempt to retain the existing modern hardware in the field throughout its economic life. The exception was river gage telemetering equipment that could only be interrogated by telephone. The 1978 Master Plan was considered acceptable to act as justification documentation for the upgrade/replacement of Harris 1000's during 1986.

The seven year life of the present 1000's will be up in FY 92/93 and it is anticipated that the replacement will not be a

mainframe/mini based system but will be some form of modular network workstation system. Therefore, it was HQUSACE's opinion that an updated Master Plan should be prepared to provide the Justification, Approvals, and Funding documentation for future Water Control Data Management Systems. Thus, in July 1989 HQUSACE requested "an update to the existing division Water Control Data Systems Master Plans (WCMP) to incorporate the concept of changing from existing mainframe-based systems to a modular network workstation system." The plan is scheduled to be in HQUSACE by 16 January 1990.

A task force consisting of representatives from each district and the division office was formed to develop the Master Plan. The following representatives made up this task force:

1. Southwestern Division office, RCC - John R. Parks.

2. Albuquerque District - Roberta Ball.

3. Fort Worth District - Thomas A. Johnston.

4. Galveston District - Charles Scheffler.

5. Little Rock District - Jim Barton.

6. Tulsa District - Mike Perryman.

7. Tulsa District - Clinton E. Word.

After some degree of arm wrestling the Task Force determined to develop a new master plan rather than appedning the old one. We also decided to develop this plan by:

1. Describing the CESWD requirements of data collection and analysis.

2. Describing the present system and facilities.

3. Stating the strengths and weaknesses of the existing system.

4. Stating future requirements.

5. Recommending that the future system maintain the strength of the existing system and address the weaknesses to the fullest extent possible.

This document will act as procurement and develop

ment guidelines and not hardware/software specifications. This should allow us to avoid specifying particular hardware or software and hopefully avoiding buying equipment that is outdated by the time it is received. The Plan has been distributed for review and comment. It should be noted that the review process has a very short time frame. The document has to be completed early enough for FY 90 PRIP funding. Mr. Word commended the task group for the good work that they had done. Each group representative was assigned a specific chapter(s), when all chapter were completed the report was assigned to a member of the task group for editing. At the end of the discussion, CESWDO stressed that justification of the system should be based on workload and not the number of people. Each district is expected to provide input to the task group for their justification.

V. NESDIS UPDATE. Mr. John Parks reported as follows:

a. Status of the New Data Collection System (DCS).

1. Data Collection System Automatic Processing Subsystem (DAPS). DAPS has been installed and the old system removed. This was completed in Oct 89.

2. Domestic Communications Satellite (DOMSAT). GSA has given NOOA's National Environmental, Satellite, Data, and Information Service (NESDIS) authorization to proceed with the acquisition of a system to broadcast Data Collection Platform (DCP) data to the user community via a Domestic Communications Satellite (DOMSAT). The RFP will be on the street by December 1989 and procurement should be completed in about nine (9) months. The estimated cost of the DOMSAT receiver is about $15,000-20,000. There probably will be an option to lease these also. The dish size will be in the 1 - 2 meter range.

3. DOMSAT Receive Only Terminal (DROT). The software for the DROT is in the test phase at the present. This software will be made available to the user community on floppy disk when the testing is completed.

4. The final User Interface Manual should be ready in the next few months. This will be mailed to all users who have an ID in the system.

B. Satellite Telemetry Interagency Working Group (STIWG).

1. Data Collection Platform (DCP) BAUD Rate Increase.

The group has sponsored a higher baud rates study for DCPs using GOES. The study is giving consideration to the use of 300 bps random, 300 bps self-times and 1200 bps self-timed channels. The interagency group is proposing that thirty-three (33) new channels be dedicated to higher baud rates.

C. GOES DCS Questionnaire. The questionnaire is to be returned through coordinator by 15 Dec 89.

D. Next GOES TWG meeting 14-15 Feb 89. Recommend each office make an effort to attend at least one of these quarterly meetings a year.

VI. DROUGHT CONTINGENCY PLAN. Mr. Ralph Garland commended the districts for the good work they had done in developing CESWD Drought Contingency Plans (DCP) and for their timely submittals for review. DCPs are scheduled for 24 basins or sub-basins with the CESWD. To date 19 have been submitted with the five remaining to be submitted in FY 90 for CESWDO's review. All plans are scheduled to be completed by the spring of 1991. Ralph stated that he saw no problems in accomplishing the schedule. During the course of reviewing the plans, a couple of issues surfaced that should be noted. First, the cover of the report should list the names of Corps' projects for ease of identification. Second, description of Level 1 and any other parts of text, delete all references to the Chief of Engineering Division as having the responsibility for declaring Level 1 drought actions. This level is intended to do business as usual. In closing his presentation, Mr. Garland asked that a representative from each district relate experiences that they may have had during DCP development, coordination with other state and Federal agencies, etc. The following are responses from the Districts:

a. CESWA - Reviews favorable. However, each plan has been prefaced with statements recognizing that waters in the river basins within the Albuquerque District boundaries are fully appropriated. Therefore, the District does not conceive of any circumstances where it could declare waters surplus or storage could be reallocated.

b. CESWF - Review comments have been quite detailed especially on the area of the report that addresses the potential use of inactive storage. Water supply contract holders are opposed because they feel that they should be given preference if water could be contracted from inactive storage. This debate has resulted in requests from water supply contractors for Grapevine Lake of Trinity River Basin to revise all contracts with the Corps to include all storage from streambed elevation to top of conservation pool. Currently the request is in HQUSACE for a decision.

c. CESWG - Since the Galveston District does not have any permanent storage projects, no plans are required. They will coordinate with and support the Fort Worth District in drought activities for the lower river basins.

d. CESWL - Generally reviews have been favorable. The SWPA has expressed concern for the declaration of surplus water, particularly the dead storage in hydropower projects.

e. CESWT - In general, no adverse comments.

VII. WATER CONTROL MANUALS. Mr. Charles Sullivan commended the Districts for their efforts in manual development and submittals for the past year. Also, stated that the schedules for the upcoming five years look good overall. At this point a lengthy discussion took place concerning funding for manual development and the level of funding in the overall O&M budget. All agreed that funding for manuals is progressively becoming more of a problem each year. Level 3 is the level that allows for the development of water control manuals; however, funds ear marked for water management activities are usually cut from the budget. In order to accomplish some work towards the development of manuals, it was agreed that chapter 6, 7, and 8 of the manual would be done with level 1 funding which allows for developing plans of regulations. It was also agreed that the water control manual schedules would be revised to reflect this change if only a plan of regulation would be done.

VIII. DISTRICT STATUS REPORTS.

a. Albuquerque District. Mr. Dick Kreiner reported that one of the highlights of the year was that the reorganization of their Planning Branch which resulted in the elevation of the regulation unit to a Section status. Reservoir control personnel visited nine projects during the year. Watersheds within Albuquerque District received well below normal snowmelt runoff for the second year in a row. No major rainfall events occurred in 1989. Construction of the non-Federal Abiquiu Dam Hydropower Project continued. The conduit was closed from 15 November 1988 to 10 March 1989 to permit the construction of the plenum chamber and associated works. During this period, a flow of approximately 50 cfs was pumped over the dam to meet downstream fish and wildlife needs. The project is 95 percent complete and is expected to be on line by mid 1990. The completion of the project is being delayed due to a levelness problem with the generators.

Two deviations were requested for Abiquiu Reservoir which allowed for the reduction of releases to facilitate the maintenance of diversion structures below the dam. Also, one deviation was requested on the Rio Grande in which Cochiti Lake and Jemez Canyon Reservoir coordinated to reduce the combined release to assist in the installation of channel protective works. Brantley Reservoir, a new Bureau of Reclamation project on the Pecos River above Carlsbad, New Mexico, is now fully operational. The reservoir filling plan was completed during 1989. The old McMillan Dam, which is located within the reservoir area of Brantley, is scheduled to be breached in the fall of 1990.

The reevaluation of the Rio Grande Operating Plan study was completed in July 1989. The 2-year multi-agency study analyzed the operation of Federal reservoirs in the Upper Rio Grande Basin. As a direct result of the study, various opportunities were identified to enhance flood control and improve the beneficial use of the water resources in the Rio Grande Basin above Fort Quitman, Texas. Also, specific projects have been identified for future study. CESWA continued to work on development of Drought Contingency Plans (DCP) for the Arkansas, Canadian, Pecos River, and Rio Grande Basins. The Arkansas River Basin DCP was completed and submitted to the Corps of Engineers Southwestern Division (CESWD) for final approval. The Canadian River Basin DCP was disseminated for interagency review and is being revised to address interagency comments. It is scheduled for final submittal to CESWD in November 1989. The Pecos River Basin DCP was sent out for interagency review in September 1989, and is scheduled for final submittal to CESWD in December 1989. The Rio Grande Basin DCP is being developed and is scheduled for first draft submittal to CESWD in December 1989.

During FY 89 the Arkansas River Basin was in a moderate to severe drought with John Martin Reservoir and Trinidad Lake each reaching Level 3 severity. Trinidad Lake and John Martin Reservoir were lowered considerably as a result of the irrigation demand caused by the dry conditions. No requests for assistance or coordination were received by the Albuquerque District.

b. LITTLE ROCK DISTRICT. Mr. Jim Proctor reported that rainfall was generally above normal with highest amounts occurring in February, March, May, June, and July. No major flooding problems were experienced in the District.

The District was given approval for 22 deviations which dealt with shoals in the Navigation channel, for lower regulating stages and for others such as hydropower, Game & Fish, etc. Reservoir Control personnel visited six projects to meet with personnel and to tour the projects.

Overall, it was a fairly quiet year and it gave us time to work on water control manuals and continue development of the WCDS. Essentially all drought contingency plans were completed during the year. The WCDS data base was expanded to include historical data for each project and key river gages. This gives the capability to use both current and historical data on a real-time basis for statistical evaluations and for comparative purposes. Also, has allowed us to be much more responsive inquiries which require analyses based on historical data.

A study to install an artificial intelligence system at L&D No. 6 was initiated during the past year. The purpose of the system is to assist in managing the flow along the Arkansas River. The CRREL has been requested to assist with the develop-

ment of the study. Jim expects the system to be operational in 1992.. An automated oxygen injection system was installed at Table Rick with the capability to inject molecular oxygen into all four turbines up to their full output of 15,000 cfs. Two non-Federal hydropower facilities were in operation at two of the District's Arkansas River projects (L&D No 13, and L&D No. 7). They appear to be working smoothly. A third is scheduled for start of construction this FY. At the request of the CESWDO, the District requested hydro data from the non-Federal operators. However, the District has not been successful in obtaining the data. Operators are reluctant to provide information because of their concern for why the Corps would need such information. After some discussion on the subject, it was not clear if we really need the information. However, additional guidance will be provided to CESWL.

White River low flow releases appear to be a slowly increasing interest on the part of congressional offices for some type of guaranteed fishery release from our White River Lakes. This may ultimately lead to a change in storage allocations or some type of rule curve operation. Our Planning Division completed a reconnaissance report on a fishery release scheme for some fairly large releases. The plan appears to have potential and they are negotiating for a cost shared feasibility study at this time.

During the year, we revised the daily lake and river reports to include current, as well as historical data, so that managers are provided a means of comparing the current status to historical averages for the same day.

The White River and Arkansas River Basins hydrologic simulation models were programmed to be utilized in reconstructing natural conditions for benefits - project accomplishment - analyses. The revised models key directly into our WCDS data base and can be run on a real-time basis as a flood is in progress to show the benefit of our flood regulations.

c. FORT WORTH DISTRICT. Mr. Arnold Escobar reported that the year began under drought conditions with most lake levels low into their conservation pools. Record low levels occurred at Stillhouse Hollow, Benbrook, and Sam Rayburn. However, above normal rainfall which occurred during March, April, May, and June 1989, forced 19 of the 24 Corps' projects to utilize flood control storage. Record high levels were established for Benbrook, Lavon, Joe Pool, and Ray Roberts (filling stage). Flood control storage was exceeded at Benbrook (spilled through notch of spillway), Grapevine and Lewisville (thru uncontrolled spillways) and Lavon (induced surcharge). Significant flood control operations were required for other projects throughout the District.

Lake control personnel visited seven of the 24 projects to discuss regulation procedures, data collection, and water control manuals. Eleven requests to deviate from approved plans of regulation were made to CESWDO during the year. Arnold noted that the reorganization (FY 88) of the Reservoir Control Section proved to be very beneficial especially during the height of flood operations which required regulators to be on duty for 24 hour periods. The non-Federal hydropower facility at Canyon Dam was completed and went into commercial power production in January 1989. Tests were initiated on the Corps' hydropower plant at Town Bluff in April 89 and power production began in May 89. The facility will be under Corps' O&M sometime during FY 90, pending completion of tests. Non-Federal license applications are being reviewed for Lewisville, Ray Roberts, Wright Patman and Lake O' Pines.

Completed Water Quality Reports on Stillhouse Hollow, and Somerville. No major problems surfaced. No sedimentation activities during the past year. Cooperative programs continued with the NWS and the USGS. Flood damages prevented by District projects during the year exceeded $470 million. Lake attendance dropped by about 30 percent, probably due to extreme high lake levels during the spring and summer. Arnold concluded his report by saying that Mr. Doug Perrin would give a slide presentation to illustrate reservoir operations during the floods of March thru June 89.

Mr. Dough Perrin, Chief, Lake Control Unit, gave a slide presentation on the flooding activities conducted by the Fort Worth District Reservoir Control Section during the major flood events of [illegible]un 1989. All river basins in the District required flood co[illegible] operations with the exception of the Colorado and Guad[illegible]e River Basins. The most severest flooding took place in the [illegible]i [illegible]ver Basin. The slides showed project operations, hydrograp[illegible] [illegible]wnstream control points, flood scenes, etc. Mr. Perrin ended his presentation by cautioning the group that stream gaging data should be closely checked prior to making regulation decisions. This is particularly critical for high or extreme flows.

d. TULSA DISTRICT. Mr. Ross Copley reported flows in the Arkansas River Basin were near normal during the past year. Flood stage at the Van Buren gages was exceeded on only two days. Rainfall was above normal at all projects in the basin with the exception of Council Grove, Marion, and John Redmond. Rainfall ranged from 20 inches above normal at Norman and Arcadia in Oklahoma, to 3 inches below normal at Council Grove, Marion, and John Redmond in Kansas. Inflows ranged from 3.3 times the normal at Arcadia to 35% of normal at Marion. In general, the winter and spring rainfall was below normal and June, July, and August were above normal. Six different taper operations were run during the year on the navigation system.

In the Red River Basin flows averaged about 140% of normal. Rainfall averaged 130% of normal and ranged from 25.6 inches above normal at McGee Creek to 1.0 inch below normal at Altus. All projects, with the exception of Arbuckle, experienced above normal inflow. A major rise occurred in Lake Texoma, Foss, Fort Cobb, and Waurika lakes in June.

The Environmental Analysis and Support Branch performed water quality studies at 4 projects during the past year.

a. Lake Texoma. Continued to collect data for determining the effect of the net pen aquaculture of channel catfish on lake water quality.

b. Arcadia Lake. Completed field work on water quality and sediment study.

c. Pine Creek Lake. Completed field work on a water quality study to obtain baseline data to relate to the future impacts of clearcutting in the watershed.

d. Wister Lake. Began field work to obtain baseline data to relate to possible effects of an existing poultry plant and the potential expansion of the poultry industry in the basin.

Detailed sediment resurveys were completed on Keystone, Birch and El Dorado Lakes. Hydrographic surveys were conducted on El Dorado, Birch, Keystone and Skiatook Lakes. A hydrographic survey was also conducted on Santa Rosa Lake for the Albuquerque District. Contracts were awarded to process the data from sediment resurveys for Kaw and Wister Lakes. Another contract was awarded for reevaluation of the segmental areas of Lake Texoma.

Navigation channel commercial movements in Oklahoma for FY 89 increased 18% over the tonnage moved in FY 88. Hydropower generation at the Tulsa District projects increased about 800 GWH over FY 88. However, it is about 300 GWH less than the last 4 years average generation. Flood damages prevented amounted to $143,614 in the Arkansas Basin and $17,559,000 in the Red River Basin in FY 89.

During the past year a memorandum of agreement between the Kansas Water Office and the Tulsa District was completed and signed. The agreement pertains to the operation of the conservation storage in Toronto, Elk City, and Fall River lakes in the Verdigris River Basin.

Drought contingency plans were developed for the Upper Neosho River Basin, the Lower Verdigris Basin, the Lower Arkansas Basin, and the Upper Red Basin. The basins included 13 projects. Draft plans have been completed for the Lower Red Basin, the Canadian Basin, and the Upper Verdigris Basin. These basins include 14 projects. Plans for the remaining projects are scheduled for completion this year.

During FY 89 water control manuals were submitted and approved by CESWD for Toronto and McGee Creek. The manual for Keystone has been completed and submitted to CESWD. Three additional manuals are currently being prepared by contract. (Altus, Pensacola, and Hulah)

E. GALVESTON DISTRICT. Mr. Ron Meyers presented the District's past year activities. All projects were visited by hydrology and hydraulics personnel to discuss operational procedures and to make sediment deposition inspections. The only special operations for both Addicks and Barker Reservoirs were for downstream recreational activities. No water quality activities during the year. Cooperative programs with the NWS USGS continued. Flood damages prevented during the past year exceeded $200 million.

IX. NEXRAD OVERVIEW. Mr. Steve Fortenberry showed a film on Next Generation Weather Radar (NEXRAD) which gave the use and development of NEXRAD to be installed at selected stations throughout the United States. Improvements of doppler radar over conventional radar was shown. A slide presentation was made and the Corps of Engineers' involvement was explained. The CESWD was appointed by HQUSACE as the lead division in technical development and planning for NEXRAD. The four phases of the System Acquisition was presented. The system definition and validation phases have been completed, the limited production phase is in progress and the full production phase option should be exercised in the spring of 1990. A slide showing the ten USACE divisions and the NEXRAD sites within the geographical boundaries of the divisions was shown. Another slide showed the products that will be available to the USACE from each NEXRAD site. It was explained that the USACE had received approval for direct access to 133 NEXRAD sites. The CESWD is actively involved with the U.S. Air Force, National Weather Service and Federal Aviation Administration in plans for an Interim NEXRAD Communications System. The USACE is also planning to develop a Principal User Processor Interactive Emulator (PUPIE) to access the NEXRAD Radar Product Generator (RPG) and retrieve, store, and display the digital and graphic products from NEXRAD. Mr. Charles Sullivan explained that the software development for the PUPIE is expected to be funded by HQUSACE. He also emphasized that the Corps must be ready to access the data when the NEXRAD sites become operational because the current conventional radar sites will be terminated when the NEXRAD becomes operational.

X. NEXRAD INSTALLATION AND CONNECTION AT TULSA. Mr. Clinton Word reported as follows. The first operational NEXRAD unit is scheduled to be on-line at Oklahoma City this summer. The

central part of the country is to be covered first, with the Arkansas River basin being the first basin covered. The Tulsa District is in the process of developing the methodology to test the NEXRAD Hydrology package for the Corps.

Products available from the NEXRAD will be the following Phase I products:

a. Reflectivity Base - graphics

b. Composit reflectivity - graphics

c. Echo topes - graphics

d. Vertically integrated liquid water - graphics

e. Severe weather probability - graphics

f. Storm tracking information - graphics

g. Storm tracking overlay - graphics

h. 1-hr surface rainfall accumulation - graphics

i. 1-hr surface rainfall accumulation - digital

j. 3-hr rainfall accumulation - graphics

k. Storm total rainfall accumulation - graphics

l. 1-hr total projected rainfall - graphics

m. 1-hr total projected rainfall - digital

n. 1-hr projected critical rainfall prob - graphics

We are presently looking at two methods for attaining the test data. First is the direct dial-in communication via a port on the RPG. This will be made possible through the PUPIE software package which is being contracted for by CESWDO. The second method is through the Tulsa RFC interfacing with their PRIME computer which is presently being installed. In each of these cases the data will be retrieved and stored in a PC/Harris network giving access to the data through the network or the present Harris system.

Clinton pointed out some problems that have not been satisfied. These are:

a. While the precipitation processing software has been tested at the National Center for Atmospheric Research (NCAR) it is not available to us. Therefore, we can only speculate how this data will be tested and modified.

b. There is the question of ground truthing. The precipitation package uses a network of rain gages to "ground truth" the precipitation amounts. We anticipate that we too will want to do some ground truthing. There is the question of how and with what. We are presently having the USGS verify our DCPs for accuracy. In the past rain gages have been placed on located stream gages. This may not be acceptable in the future.

c. There is the problem of assimilation into the forecasting models. NEXRAD will come to us on a 4K X 4K grid (2x2) NM. This will be LFM format not the normal cartesian coordinate grid system. The models use a 3x5 MN grid. HEC has developed software which uses a system called kriging which will take rainfall from a 3x5 and convert to a basin average. These programs (RADRAN AND OTHERS) need to be modified.

In summary, Mr. Word asked that each district:

a. Look at their scheduled date for NEXRAD and provide $16K for the PRIP program in order that they may purchase their communication board.

b. Complete the development of forecast models.

c. Have the USGS verify the accuracy of their gages.

XI. AFOS AND UPGRADE AT FORT WORTH. The Fort Worth RFC is replacing the S-140 with the COMPAQ 386, which will improve reception of AFOS data products to Dallas, Galveston, and Albuquerque reported Mr. Steve Fortenberry. The Tulsa RFC will make a similar conversion at a later date. Steve passed out a product list and asked that it be edited for current requirements. The Fort Worth and Tulsa District's data list should be identical as possible in order that they may be used as a backup system if one fails.

XII. MORNING REPORT PROGRAM - ALBUQUERQUE DISTRICT. Mr. Mark Wittrock began his discussion by giving a brief description of the Corps and Section 7 Projects within the District. The Morning Report calculations were done by hand until 1982. From 1982 thru 1983 the Apple computer was used to make the Morning Report computations. Had problems in using the Apple because the programs were not user friendly. Due to experiences with the Apple, it was decided that a replacement program was needed.

The replacement programs were developed with the objectives of simplicity, easy to make corrections, flexibility, manageability, adaptability for the use of existing and future DCPs and use of existing hardware. The program, as developed, uses the modular method, is Harris based, menu driven, spread sheet input, is user friendly, and consists of 11 HEC programs, 7 in-house programs and 2 communication programs. The benefits of the Morning Report program are less work by reservoir managers,

eliminates eral manual procedures, allow for better record keeping, etc. Some disadvantages are long distant phone calls by each project, more time by reservoir control personnel to manage calls, etc. Currently, the program is being tested at the Abiquiu project for 2 months. Mark has high expectations that the program will be implemented at all projects.

XIII. OTHER TOPICS. RADAR DEMONSTRATION.

a. Mr. Tom Engdahl of the Waterways Experiment Station (WES) gave a radar demonstration on the PC. Tom is currently working on programs with CRREL for extracting radar imagery and converting them to rainfall intensities. The program is capable of summing the intensities to get hourly rainfall values over a given basin. The program is also capable of using sub-basins and computing mass rainfall curves for direct input into HEC models. The program is currently operational for those who have commercial radar available. The software will run on the PC, output is DSS and the program is user friendly. Tom stated that he is currently working on software for rainfall calibration and hopes ultimately to have a stand-alone system which means that anyone can run the system. The program runs in a real-time mode. WES will make software available to field offices upon request, however, can expect some bugs. This system will have the capability to allow NEXRAD data, with modification, to be used in these programs which provide data into the HEC models.

B. SUMMARY. Mr. Walker, summarized the meeting by revisiting major action issues that had surfaced during the meeting.

1. Input into WCDS-computer work groups.

2. Keep task group on Master Plan in Tack. Will meet annually to review for revisions. Estus suggested giving task members some type of recognition.

3. Revise priority manual schedule to read priority plans which should include chapters 6, 7, and 8; therefore, can be in Level 1 funding. However, for those projects without a manual, the entire manual should be at Level 1.

4. Each district should take their manual schedule and develop a 5-hear schedule for the HMC.

5. Mr. Sullivan announced that next year's meeting as suggested by the Districts will be at one of the District offices. Location will be decided later.

FIELD TRIP-RIO GRANDE VALLEY. To complete the annual RCC meeting a field trip was conducted in the Albuquerque area to gain a familiarity of the Rio Grande and some of the flood control works associated with it. The tour began with the Albuquerque North Diversion Channel, which was constructed by the Corps to protect

the valley areas from runoff which originates in the higher portions of the city. The tour visited two diversion structures which divert irrigation water directly from the Rio Grande for the middle Rio Grande conservancy district. A stop at the Rio Grande nature center was included to see the wildlife and riparian habitat of the Rio Grande Bosque (Forest). The tour also took in river access points and saw the Albuquerque levee system with associated bike and nature trails. To finish the field trip, the group stopped at the Isleta Pueblo to gain a cultural perspective of our Indian brothers who live with us along the Rio Grande.

AGENDA

1989 RCC Annual Meeting
Southwestern Division
Corps of Engineers

6 - 8 December 1989

1ST DAY

| | |
|---|---|
| I. Welcome | 1230 |
| II. Introduction & Opening Remarks | |
| III. Overview - HQUSACE | |
| IV. Water Control Data System (WCDS) | |
| A. WCDS - Computer Work Group | |
| B. WCDS Master Plan | |
| V. NESDIS Update | |
| VI. Drought Contingency Plans | |
| VII. Water Control Manuals | 1700 |

2ND DAY 0830

| | |
|---|---|
| VIII. District Status Reports | |
| IX. NEXRAD Overview | |
| X. NEXRAD Installation, and Connection at Tulsa | |
| XI. AFOS and Upgrade at Ft. Worth | |
| XII. Morning Report Program - Albuquerque District | |
| XIII. Other Topics | |
| Radar Demonstration | 1700 |

3RD DAY

| | |
|---|---|
| Field Trip - Rio Grande Valley | 0830 - 1200 |

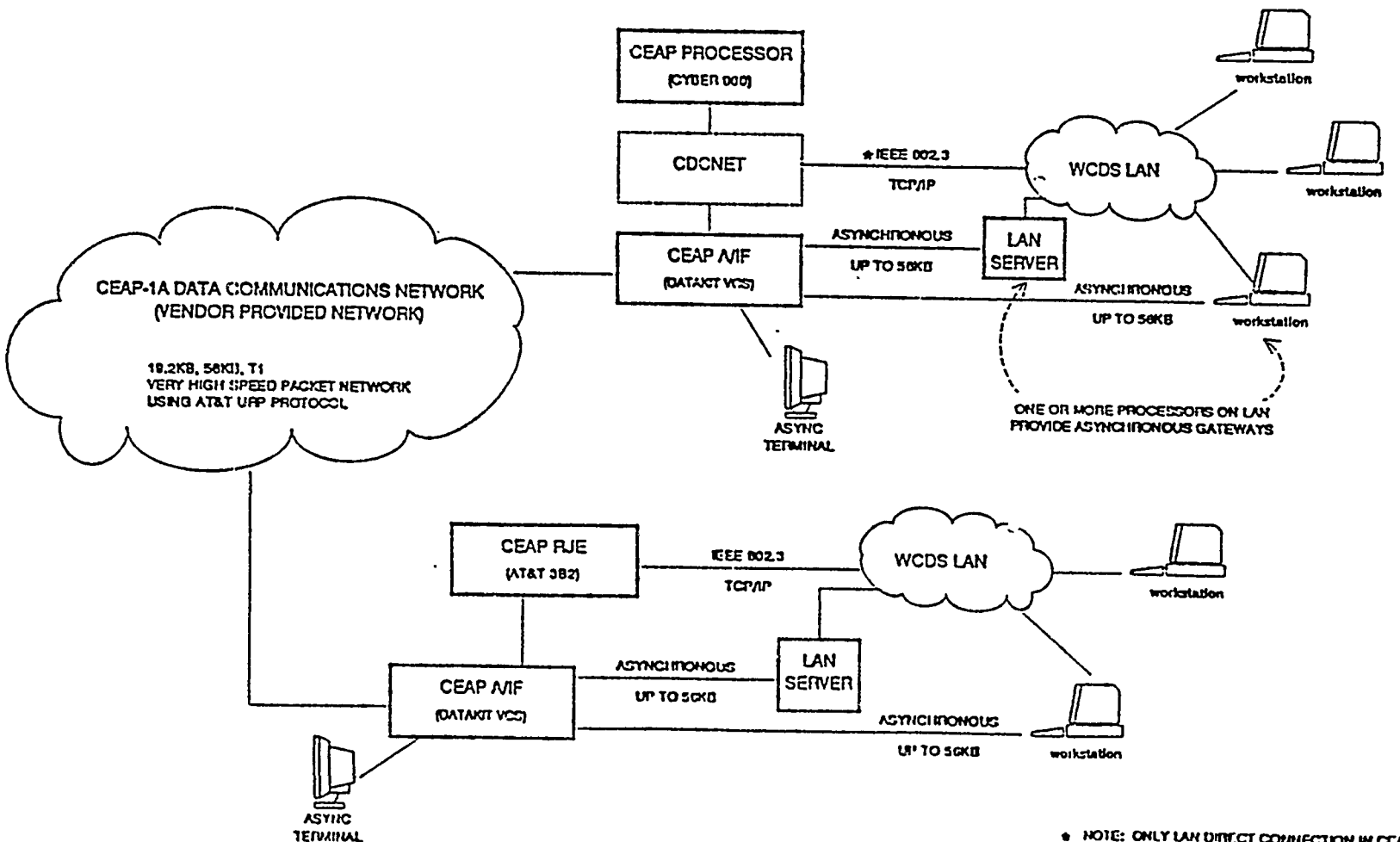
ENCL 1

1989 RCC MEETING
SOUTHWESTERN DIVISION
U.S. ARMY CORPS OF ENGINEERS
6-8 DECEMBER 1989

ATTENDANCE LIST

| NAME | ORGANIZATION |
|---|---|
| Major Phillip Smith | CESWA-ED-PC |
| Ralph Garland | CESWD-ED-WR |
| Ross Copley | CESWT-EC-HE |
| Ron Meyers | CESWG-ED-HC |
| Gary Eyster | CESWA-ED-P |
| Charles Sullivan | CESWD-ED-WR |
| Arnold Escobar | CESWF-ED-HL |
| Doug Perrin | CESWF-ED-HL |
| H. Estus Walker | CESWD-ED-W |
| James A. Proctor | CESWL-ED-HR |
| Loren Pope | CESWL-ED-H |
| Clinton Word | CESWT-EC-HC |
| Jim Barton | CESWL-ED-HR |
| Carroll Scoggins | CESWT-EC-W |
| Mark Wittrock | CESWA-ED-PC |
| John R. Parks | CESWD-ED-WR |
| John Rael | CESWF-ED-HL |
| John Kimball | CESWA-ED-PC |
| Thomas Ryan | CESWA-ED-PC |
| Dick DiBuono | CECW-EH-W |
| Steve Fortenberry | CESWD-ED-WR |
| Tom Engdahl | CEWES-EN-C |

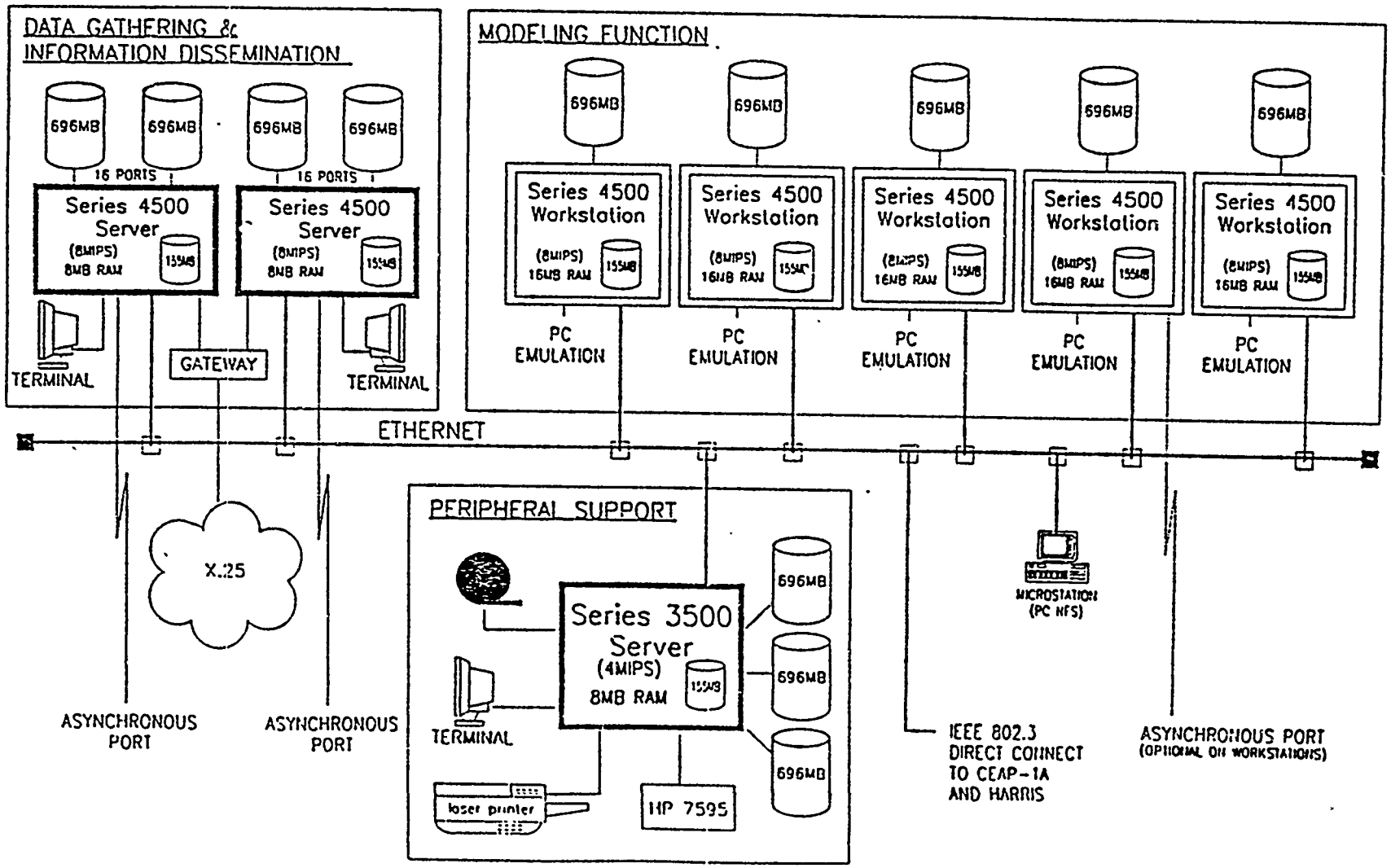
# WCDS CONNECTIVITY OPTIONS
# TO CEAP-1A COMMUNICATIONS NETWORK




* NOTE: ONLY LAN DIRECT CONNECTION IN CEAP-1A CONTRACT IS IEEE 802.3 ETHERNET

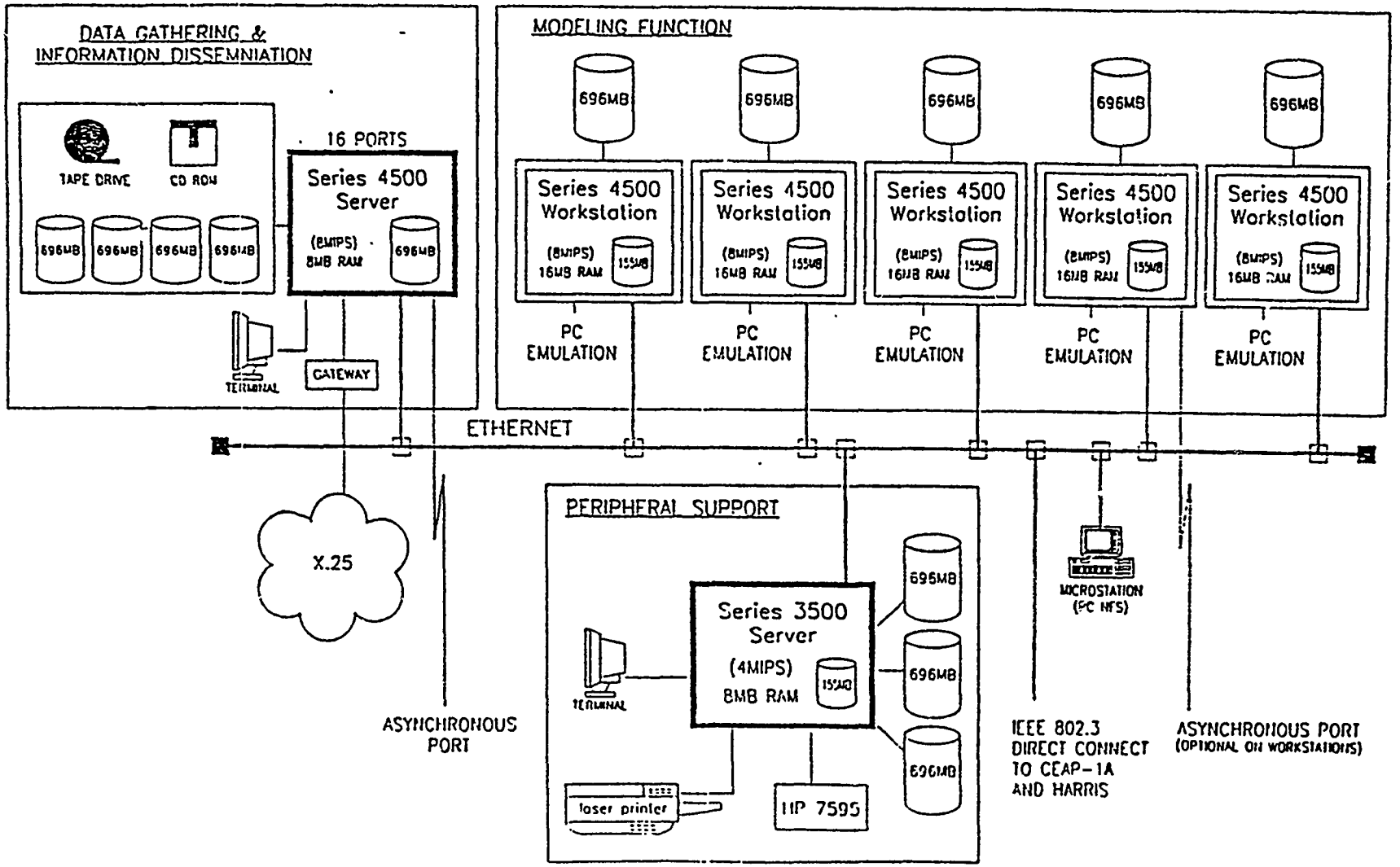
ENCL 3

# ALTERNATIVE 1



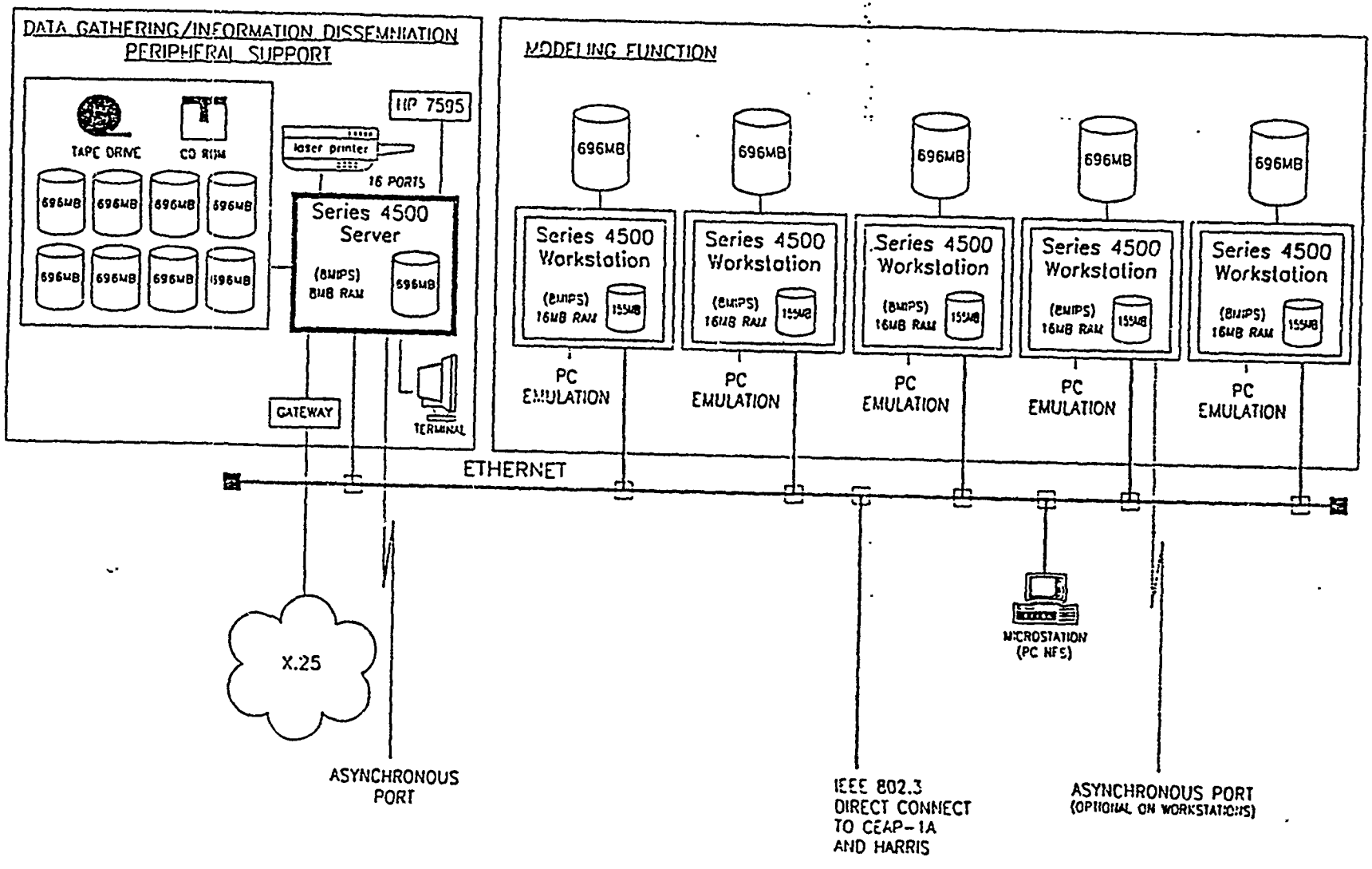

ENCL 4

# ALTERNATIVE 2




ENCL 5

# ALTERNATIVE 3




ENCL 6

MINUTES

Arkansas River Basin Coordinating Committee Meeting
1114 Commerce Street, Dallas, Texas
12 May 1989

1. The Arkansas River Basin Coordinating Committee meeting was held in the Southwestern Division office, Corps of Engineers, Dallas, Texas on 12 May 1989. A copy of the agenda is attached as enclosure 1. The meeting was attended by 55 people, which included 17 of 23 Committee members and 38 invited guests. A copy of the attendance list is attached as enclosure 2.

2. Brigadier General Robert C. Lee, Division Engineer, Southwestern Division, Corps of Engineers, and chairman of the committee, welcomed the group to the 3rd meeting of the reconstituted Arkansas River Basin Coordinating Committee and introduced the attendees.

He briefly reviewed the background that led to the formation of the original Arkansas River Basin Coordinating Committee and the reconstitution of the present committee. He pointed out that the committee, of state and federal representatives concerned with the many uses within the basin, serves as an advisory committee to the Corps of Engineers in the development of operating plans for the System.

BG Lee stated that today we want to review the operation of the system during the past year and present a status report on the Arkansas River Basin Arkansas and Oklahoma Feasibility Study.

3. Mr. Estus Walker, Chief, Water Management Branch, Southwestern Division, Corps of Engineers, presented a review of the 1988/1989 operations of the basin projects. A copy of Mr. Walker's presentation is attached as enclosure 3.

4. David Burrough, Chief, Planning Division, Little Rock District presented a status report on the Arkansas River Basin, AR and OK, Feasibility Study. A copy of Mr Burrough's presentation is attached as enclosure 4.

6. Following these presentations, committee members were given the opportunity to address the group. Those committee members present made remarks appropriate to their areas of interest and expertise. A summary of these remarks are as follows:

a. Jim Barnett, Executive Director, Oklahoma Water Resources board -- He expressed concern over the Corps' continuing use of conservation storage in Oklahoma reservoirs to augment navigation flows. If this storage is use to benefit navigation then navigation should pay that part of the project cost. There

should be legislation to provide for navigation as a project purpose. He doesn't agree with the OCE counsel opinion but prefers the GAO opinion. A written statement was submitted and is attached as enclosure 5.

b. Steve Lewis, Director, Oklahoma Department of Wildlife Conservation -- He said that they have a good working relationship with the Tulsa District. Wants to be sure that fish and wildlife impacts are included in the Corps' plans and considerations. A written statement was submitted and is attached as enclosure 6.

c. Ed Thompson, Ark-Oklahoma Port Operators Association -- He wanted to know when the Corps would announce their support for the Lock and Dam on the White River entrance channel. They are concerned about the navigation problems in this area. General Lee responded that he is not prepared to submit the official report at this time.

d. Bob Price, Ark Soil Conservation Service -- Mr. Price reported on their study plans within the Illinois River Basin in northwest Arkansas and northeast Oklahoma. They are currently developing three studies which are "Illinois River Cooperative River Basin Study", "Muddy Fork of Illinois", and "Illinois Subbasin Reports". A copy of the written report is attached as enclosure 7.

e. Chuck Thomas, Oklahoma Soil Conservation Service (SCS) -- He reported on their PL 566 activity on Brazil Creek Watershed in the Poteau River Basin. The SCS has been authorized to provide planning assistance on the watershed to develop a plan for the purpose of flood prevention and to provide for future municipal and industrial water storage. A copy of the written report is attached as enclosure 8.

f. LTCM Phill Rhodes, U.S. Coast Guard -- The working groups for navigation interest is a good tool and helps the Coast Guard, navigation interest, and Corps to work together. The Coast Guard has two boats on the river.

g. Ed Lindsey, Southwestern Power Administration -- He said one of their current concerns is that we may be in a long term drought in the mid west. The inflows during April were only 14% of median. SWPA is to put out a drought contingency plan. They are concerned about the delay on the Fort Gibson contract which in the Chief of Engineers office.

h. Robert Portiss, Tulsa Port of Catoosa -- Said not to forget about the need of navigation when looking at the system operation. If we are not careful we could loose some navigation. There could be a diversion of shipping to rail and/or truck. Appreciates the needs of other users such as hydropower, etc. The port of Catoosa has about 2,000 acres of land and $165,000,000 private investments.

j. Jim Phillips, Arkansas Waterways Commission -- Daily operation of the river needs to consider the needs of all users. He feels that can't just develop a plan and let it run. Which ever plan is chosen, we must look at all benefits as we operate and make decisions accordingly. Thinks the plan should be reviewed at least twice a year.

k. Glen Cheatham, Oklahoma Department of Commerce -- The exercise where the military moved equipment on the river was good. The military should include the use of the waterway in their mobilization plans.

l. Barry McKuin, Arkansas Basin Association -- The Arkansas Basin Association feels that the reliability of the system is in jeopardy until the White River Entrance Channel problem is solved. They want the time frame reduced to get an early study completion and construction started on this project.

m. Clifton Meador, Arkansas Industrial Development Commission -- Expressed and interest that the irrigation needs in the basin be given consideration.

n. Stephen Forsythe, U.S. Fish & Wildlife Service, Tulsa -- Has been involved in activities connected with the feasibility studies.

o. Earl Smith, Arkansas Soil & Water Conservation Commission -- Pleased with the cooperation on the study and expressed an interest in the water supply aspects of the study.

9. Conclusions.

a. Brigadier General Lee stated that the advice of the committee is greatly appreciated and that we should move on from where we are to finish the feasibility study. He told the members to feel free to contact him any time.

General Lee has recently appointed a task committee to take an independent look at the way the Arkansas River Navigation channel has reacted to the training works and operation of the system. This task committee is taking a look at areas where minor changes could improve the system. Sedimentation and shoaling patterns will be a major area of interest. Outside expertise will be involved as the work progresses. In view of the increased pressure on the federal budget, these investigations are most important. We plan to give the coordinating committee a report on task group activities at your next meeting.

b. The next meeting was tentatively set for next year.

10. Meeting Adjourned.

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8 Enclosures

1. Agenda
2. Attendance List
3. Review of System Operation During 1988/1989
   Presentation - by Mr. Estus Walker
4. Arkansas River Basin, AR and OK, Feasibility Study
Presentation - by Mr. David Burrough
5. Written Comments - OK Water Resources Board
6. " " - OK Department of Wildlife Conservation
7. " " - AR Soil Conservation Service
8. " " - OK Soil Conservation Service

Minutes

Trinity River Basin Water Management Interest Meeting
Room 411, 1114 Commerce Street
Dallas, Texas
1 August 1989

The meeting of Trinity River Basin Water Management interest was held in the Southwestern Division, Corps of Engineers office in Dallas TX on 1 August 1989. A copy of the agenda is attached as enclosure 1. The meeting was attended by 40 representatives from federal, state, and local agencies which have an interest in water management in the Trinity River Basin. A list of the attendees is attached as enclosure 2.

Brigadier General Robert C. Lee, Division Engineer, Southwestern Division, Corps of Engineers and Arthur D. Denys, Chief, Engineering Division welcomed the group to the Corps facilities and encouraged the group to freely exchange ideas and concerns about water control operations in the Trinity River Basin.

The purpose of the meeting was to review activities during the May-June 1989 series of storms which created severe flooding conditions in the Trinity River Basin, and to exchange ideas on how the various water management interest groups could collectively improve operations. These storms created widespread flooding which had not been experienced in several years. In fact there were several records set on the streams and lakes in the basin. This was a sharp contrast to the extremely dry conditions which prevailed during the past year.

The attendees actively participated in discussions centering around the following presentations and indicated that they were appreciative of the opportunity to share experiences.

1. Review of May-June 1989 Flood Control Activities at Corps Projects - By Doug Perrin, Chief of Lake Control Unit, Fort Worth Corps of Engineers District. He gave a graphic and pictorial slide presentation on the operation of the Corps Lakes in the upper Trinity Basin. A copy of the slides showing information about flood stages, pool elevations, damages prevented, etc are attached as enclosure 3.

2. Review of the May - June 1989 Storms in North Texas and the National Weather Service River Forecast Center Activities - By David G. Morris, Hydrologist-in-Charge, River Forecast Center, National Weather Service, Fort Worth. He gave a brief presentation on the rainfall during the May-June period and included some statistics on the river

conditions. He stated that the rainfall in the Grapevine Lake area accumulated over 26 inches over the period 3 May - 14 June 1989. A copy of the handout is attached as enclosure 4.

3. Review of the City of Dallas Emergency Preparedness Office activities and problems encountered in areas outside of the Dallas Levee System. - By Steve White, Dallas Levee District. Mr White indicated that the levee system operated as designed. A handout which is attached as enclosure 5 summarizes problems experienced during the storm period.

4. Impact of the flood on the Tarrant County Water Control Dist No 1 Lakes. - Mr Alan Thomas, Tarrant County Water Control Dist No 1., Fort Worth, Tx. gave a slide presentation of the flooding events along the West Fork, including flooding at Bridgeport Lake, Eagle Mountain Lake, and Lake Worth.

5. Impact of the flood on the Trinity River Authority Projects in the Upper and Lower Trinity Basin. - By Hank Clark and Jim Sims, Trinity River Authority, Arlington, Tx. Mr Clark discussed the operation of the TRA regional wastewater treatment plant located near I-30 and Loop 12. He said no significant problems were encountered except there were problems in putting the manhole covers back on along the TRA main line in the Elm Fork Trinity. Mr Sims discussed the operation of Lake Livingston and handed out a paper concerning the lake's operational procedures and a chart showing flows in the lower Trinity River. This handout is attached as enclosure 6.

6. Status report on the Soil Conservation Service (SCS) Projects in the basin and their response during the flood period. - James Haily, State Conservationist, Soil Conservation Service, Temple, TX. made a brief presentation on the status of several authorized watershed programs in the Upper Trinity River Basin. He said most of the authorized, but not constructed reservoirs, would probably not be built. A copy of his report is attached as enclosure 7.

7. Status Update on Local Protection Projects in the Upper Trinity - By Jerry McCrory, Planning Division, Fort Worth Corps of Engineers, District. Mr McCrory gave an overview of the ongoing Upper Trinity River Basin recon study and the ongoing Section 205 projects being investigated in the metroplex region.

8. Alternative Considerations for Flood Control and Coordination of efforts by local governments. Marc E. Elliott, North Central Texas Council of Governments, Arlington, Tx. gave an impromptu statement concerning the

environmental setting in the metroplex. A copy of a NCTCOG handout is attached as enclosure 8.

The attendees expressed considerable interest in the meeting and most of those present felt that future meetings of this nature would be beneficial. It was concluded that future meetings should not necessarily be held on a routine basis, but would be be worth while when significant milestones or events occur. It was agreed that the Corps will contact the representative organizations present in June or July 1990 to determine if and when another meeting is in order. This will be accomplished annually.

One of the more significant suggestions was that the Lake operators (ie Corps, River Authority, Water District and City lake operators and managers) meet periodically to discuss problems common to the operation of lakes in the basin. This meeting could cover items such as release plans, gaging, public usage of lake facilities, legal considerations, safety, etc and areas in which the Corps has considerable expertise to share.

The issue of loss of life that occurred as a result of the flooding was discussed in detail. It was the consensus of the group that, although it is a serious problem, about all that can be done is to continue dialog with the news media to stress the life threatening situations that are created in urban areas during these floods. This should be done early on as a flood situation develops. All agencies indicated they have developed a good rapport with the news media, and this should continue.

8 Enclosures

1. Agenda
2. Attendance List
3. Slides - Review of May-June Flood Control Activities at Corps Projects - by Doug Perrin, Corps of Engineers, Ft Worth
4. Review of May-June Storms in North Texas - by Dave Morris, National Weather Service, Ft Worth
5. City of Dallas Emergency Preparedness Activities - by Steve White, City of Dallas
6. River, Lake, and Rainfall conditions form 6/20-7/6/89 in the Lake Livingston Area - by Jim Sims, Trinity River Authority
7. Report on Trinity River Project (SCS Authorized Watershed) - by James Haily, Soil Conservation Service, Temple, Tx
8. Status Report - Trinity River Corridor Interjurisdictional Management Program - Marc Elliott, North Central Texas Council of Governments

Minutes

Trinity River Basin - Seminar for Lake Operators
Room 1A03, 819 Taylor Street
Fort Worth, Texas
19 October 1989

The meeting of the Trinity River Basin - Seminar for Lake Operators was held in the Fort Worth District, Corps of Engineers office in Fort Worth, Texas on 19 October 1989. A copy of the agenda is attached as enclosure 1. The meeting was attended by 24 representatives from Federal, state and local agencies which have an interest in lake operations in the Trinity River Basin. A list of the attendees are attached as enclosure 2.

The purpose of the meeting was to exchange information and discuss problems common to the regulation and operation of lakes in the basin. The attendees actively participated in discussions centering around the following presentations:

1. Corps of Engineers Data Collection and Plans of Regulation by Doug Perrin, Chief, Lake Control Unit, Fort Worth Corps of Engineers District. Mr. Perrin gave a slide presentation on the data collection system and plans for regulating Corps lakes. He described how field data is transmitted from river/lake gaging stations via the GOES satellite to the ground receive site and transmitted directly to the District's computer. He noted that since Corps lakes are operated as a system throughout the Trinity River Basin, flood releases when combined with downstream uncontrolled flows, will not exceed channel capacities. As such, coordination among all water management regulators is essential. Mr. Perrin discussed the Corps' involvement in developing software necessary for exchanging data among computers between the Corps, other governmental agencies and non-governmental offices. A copy of the handout is attached as enclosure 3.

2. Corps of Engineers Water Safety Program by David Davidson, Safety and Occupational Health Office, Fort Worth Corps of Engineers District. Mr. Davidson gave a review of the Water Safety Program. He explained that prior to 1980 two types of visitors were identified at Corps projects, i.e., recreationist and boaters. Currently, a third type is recognized as an individual(s) that frequents the lake area consuming alcoholic beverages. He noted that 50-80% of lake drownings are alcoholic related. Methods for providing a safe environment includes working with the local law enforcements, billboard advertising, radio messages and video presentations at public places. Mr. Davidson noted that public use of Corps lakes is governed by

Title 36 of the Code of Regulations and that actions affecting public attendance on one lake may impact visitation activities at nearby lakes.

3. Tarrant County Water Control and Improvement District No. 1 Lake Operations by Alan Thomas. Mr. Thomas reviewed operations and its differences from Corps lake operations as their lakes have no flood storage capacity. (Plans of Operation are available upon request). He noted that this year Bridgeport established a new maximum water surface elevation. Mr. Thomas expressed concern associated with an increase in the number of lawsuits and concerns with water safety, however, primary problems are related to 404 permits and water quality.

4. City of Dallas Operations by Dennis Allen and Ken DelRegno. Mr. Allen and Mr. DelRegno discussed problems within the watershed associated with erosion, encroachment, water quality liability suits and development that is changing the characteristics of the watershed. During the May-June flood, Lake Ray Hubbard's maximum lake elevation reached 436.77 feet, ngvd and the maximum outflow was approximately 40,000 cfs. As a result of a levee breach downstream, the City of Dallas is currently in litigation for $2 million in damages. They noted that the City of Dallas has adopted a policy that the city will not notify downstream landowners during floods since possible litigations may develop.

5. Trinity River Authority Lake Operations by Don Stovall. Mr. Stovall gave a slide presentation on the operation of Lake Livingston. He noted that during the May-June flood, a new maximum lake elevation was set at 132.08 feet, ngvd and the maximum outflow was approximately 73,700 cfs, the second highest outflow rate of record. During releases that range from 18,000 to 20,000 cfs, TRA administers its notification procedures as listed under their standard operating plan. Mr. Stovall explained the organization duties consisting of its laboratory that monitors water quality and environmental conditions, the Permit Section associated with inspection and licensing of septic systems, buildings, boat houses, etc. and its security and recreation duties.

6. Texas Utilities Electric Plant Operation by Mr. Robert Johnson, Mr. Scott Diermann and Mr. James Elan. TUE noted it operates 19 Dams and reservoirs throughout its jurisdiction. Major problems associated with their lakes are encroachment, urbanization changes affecting the watershed and security to gate operations.

Panel Discussion and Summary: Attendees discussed items relating to data collection, water quality, security, flood releases, water safety and the importance of continuing a dialogue to discuss related problems. Providing a safe

environment to the Corps lakes was a primary concern, since under current policies and regulations, law enforcement by Corps Park Rangers is limited and dependent on support from local law enforcement agencies. This concern was shared by all attendees.

It was the consensus of the group that future meetings would be beneficial and that an agenda addressing specific issues should be developed. Dallas offered to host the next meeting when sufficient support deems necessary.

3 Enclosures

1. Agenda
2. Attendance List
3. Corps of Engineers Data Collection and Plans of Regulation by Doug Perrin, Corps of Engineers, Fort Worth